DETERMINANTS OF CONTEXTUAL PREFERENCE FORMATION AND CHOICE: A RELATIVE VALUE THEORETIC ANALYSIS OF CHOICE DEFERRAL

By

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This dissertation shows product-choice is a manifestation of a consistent relation-based decision-making process. Results strongly suggest product-choice may be inconsistent but preferences for specific relative value relations are consistent. Product-choice variability across decision events appears to stem from changes to the decision process' inputs or the decision goal itself.

Relative value theory, the theoretical framework used in this dissertation, has three core concepts. (a) The decision goal defines the choice task and provides an interpretive filter that determines the relevancy, prominence, and valence of decision elements. (b) Decision-makers perform benefit-cost tradeoffs to assess value. (c) Diminishing marginal sensitivity pervades discriminal processes. When products have different levels of the same benefits and costs, decision-makers assess their "goodness" by contrasting their proportional increase in benefits to their proportional increase in costs: decision-makers evaluate products' proportional rate of exchange.

Proportional rate of exchange use suggests decision-makers attend to the relational properties of a constructed evaluation set's relative value structure and that information affects product choice only when it changes the relative value structure of the evaluation set. These premises were tested using choice sets composed of one or two brands from a constant set of four personal computer brands differing only in memory and price. In addition, decision urgency was varied by allowing respondents to defer the buying or the selling of any one product or by compelling them to buy or to sell one product.

The first study varied the sets' relative value structures and the intensity product-decision urgency via forced-choice and free-choice formats within a buying task. Across levels of decision urgency, product-choice depended on the sets' relative value structures, not on the available products' intrinsic value as asserted by the standard choice theory. The second study's findings replicated the buying study's findings and extended the explanatory power of relative value theory to the selling context. The third study's evaluation sets' non-diagnostic relative value structures allowed a test of the effect of decision urgency on choice. When decision urgency was high, buyers and sellers chose to maximize their respective transaction benefits; when it was intermediate, buyers and sellers tended to minimize their transaction costs instead.

CHAPTER 1
INTRODUCTION

Overview

Individual Decision-Making in Marketing Contexts

Aggregate behavior results from individual decisions. Prior to deciding whether to buy one or more units of a product, the consumer has to decide on a goal, a product class, and the product-class variant offering the best combination of functional attributes and cost. A major focus of this dissertation is the product-class-variant decision-making process of individuals who feel free to defer product-choice to a later period.

The analysis of individual choice is one of the most central topics in marketing and consumer behavior. For example, in the Handbook of Consumer Behavior (1991), three of its sixteen chapters focus on information-processing and mathematical analyses of choice. Almost all of this work has presented consumers with what might be called "forced choices" between products. However, few decisions are made under such duress in a marketing context.

Corbin (1980) pointed out that we almost always feel free to do nothing when faced with a difficult choice in the real world. She analyzed the forces that cause consumers to stop the choice process rather than bringing it to closure after problem recognition and some degree of search. As a result of her analysis, Corbin encouraged decision researchers to study why people "decide not to decide."

Trade in the marketplace depends on the decision-making of parties having opposite viewpoints: buyers and sellers. Sellers desire to acquire revenue (i.e., the acquisition of flexible assets such as money) for which they are willing to trade products (i.e., the disposal of owned

specific assets). Buyers ponder the acquisition of products (i.e., the acquisition of specific assets) for which they are willing to incur expenses (i.e., the disposal of owned flexible assets). To the extent that either party defers the completion of the choice process to a subsequent discrete choice event, the efficiency of the marketplace is hindered. Thus, Corbin's (1980) admonition is especially relevant to the understanding of behavior in the market place.

For example, Kahneman, Knetsch, and Thaler (1990) demonstrated that the discrepancy between the valuations of owners and buyers caused far fewer trading transactions to occur than the level predicted by economic theory. Following Kahneman (1992) and Kahneman et al., I concentrate on sellers of owned specific assets or "use goods" (cf. Kahneman, 1992), not "retailers" who hold goods specifically for resale. According to Kahneman, many important economic activities entail negotiations over such owned specific assets rather than the more routine retailing transactions (also see Telser, 1985).

Product-Decision Incidence

The focus of Corbin's (1980) research was general decision incidence--the likelihood of choosing from alternative modes of actions instead of maintaining the status quo. In a similar manner, I define product-decision incidence in a buying context as the likelihood of buying a product from a choice set instead of maintaining the status quo during a current choice event. The level of product-decision incidence in binary choice such as {defer,A}, is represented by the proportion of buyers opting for the proactive response of incurring an expense to acquire product A rather than maintaining their status quo: $P(A_{buy}|defer)$. In trinary choice such as {defer,A,C}, product-decision incidence refers to the proportion of buyers opting to buy A or C during the current period: $P(A_{buy},C_{buy}|defer)$.

In an opposite manner, I define product-decision incidence in a selling context as the likelihood of declining to sell an asset during the current choice event. The level of product-decision incidence in selling set {defer,A} is represented by the proportion of A's owners opting

to maintain their status quo by foregoing the revenue from the sale of A during the current period: $P(defer|A_{sell})$. For sellers having to decide whether to sell A, C, or none from {defer,A,C}, product-decision incidence refers to the proportion of owners maintaining their status quo by not selling A nor C, foregoing any revenue during the current period: $P(defer|A_{sell},C_{sell})$.

Perceived Product-Decision Urgency

Marketing decision contexts differ in terms of the perceived urgency to complete the product-decision process during a current choice event. These contexts can be categorized into three broad levels.

High product-decision urgency. It may be extremely urgent to the buyer to buy a member of the product class in the current period. Thus, choice is "forced" in the sense that the buyer will choose a member from the offered set with certainty. The overwhelming majority of marketing research on consumer choice implicitly assumes such forced choice by posing respondents with problems in which they must choose from some offered set. For example, work on context effects in choice will ask respondents to choose from binary product set {A,C} or trinary product set {A,B,C}[1] (e.g., Huber, Payne, and Puto 1982; Simonson and Tversky 1992).

Low product-decision urgency. But as noted by Corbin (1980), in most real-world choices there is no such urgency. Consumers are free to decline all products in the offered set. Some recent work in the choice models area reflects this reality by always including "choose nothing" as a base alternative in choice models (e.g., Olson and Swait, 1995). The idea is that consumers would be happier sticking with the status quo if no product exceeds their "reservation utility."

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1 In all choice sets, brands are described in terms of a benefit and a cost. The A brand always represents the product having the lowest level of benefit either within a choice set or across related choice sets. For example, in related forced-choice sets {A,B}, {A,C} and {A,B,C} the A brand is lowest, the B brand is intermediate, and the C brand is highest in terms of benefits. Unless otherwise indicated, choice sets are composed of non-dominated alternatives.

Intermediate product-decision urgency. Beginning in economics (e.g., Rothschild, 1974; Shapiro, 1983), another stream of work on "search" theory assumes that consumers may decline to buy from an offered set because a better alternative may be found by searching further, not because they find no alternative from that set to be better than the "status quo." Here, consumers assume that the offered set will change in the future, so they find it worthwhile to "defer" for now. Thus, the buyer's choice set is explicitly {defer,A}, or {defer, A, C}.

Though most research on consumer choice has focused on decision making by buyers, sellers also face issues like those above. Only sellers in a situation of extreme urgency to raise funds would be forced to sell from a set of owned products {A,B,C} or {A,C}. More often, sellers are free to refuse to sell any element from the set unless the offered price is sufficient to outweigh the benefits forgone by selling one or more of the products. Thus, sellers typically have alternatives of {no sale, sell A at $A, sell C at $C} rather than {sell A at $A, sell C at $C}. Just as in the literature on choice deferral, sellers sometimes defer to sell not just because the utility derived from now-owned products outweighs the potential monetary gain from selling at a certain price. Sometimes, sellers anticipate that by deferring to sell now a better price will be offered in the future.

In the research that follows, I focus on decisions by buyers who are free to not buy, deferring product-choice to a later period, and on decisions by sellers who are free to not sell, deferring the sale to a later period. I will, however, explain the patterns of choice in terms of concepts from the literature on "forced" choice. Some are concepts that heretofore have not been seen as related to emerging findings on "avoidant" choice from free-choice sets. I will also attempt to show the implications of findings for a third emerging literature on buyer-seller asymmetries in value functions, studied under the general rubric of the "endowment effect." In all of this research, I will appeal to a theory of context called "relative value" theory (Hollman and Lynch, 1997).

An important aim of the dissertation is to show that choice processes are stable across forced-choice and free-choice sets. Finding invariance of choice patterns across these two

contexts is contrary to current theory (e.g., Goldstein and Busemeyer, 1992; Mellers, Ordóñez, and Birnbaum, 1992; Tversky and Shafir, 1992a). Using relative value theory (Hollman and Lynch, 1997), I show that distinctive set changes correspond to characteristic choice patterns across forced-choice and free-choice contexts.

Research on Choice Behavior across Forced-Choice and Free-Choice Contexts

Free-Choice Context

Economic perspective

Reservation threshold. To explain the observed variability in product-decision incidence, economists developed the concept of a reservation threshold: (a) a "reservation utility" when heterogeneous products are sold at similar prices; (b) a "reservation price" when homogeneous products are sold at varying prices. For example, the sellers' reservation price is the minimum price they will accept to dispose of product A; the buyer's reservation price is the maximum price buyers will consider paying to acquire A (see Lilien, Kotler, and Moorthy, 1992).

In addition, reservation thresholds are supposed to depend on the importance attached to the benefits sought from a trading transaction, implying there is taste heterogeneity across people. For example, the higher the buyers' taste for quality is, the higher the price they are willing to pay for a high quality product (Shapiro, 1983). Since decision-makers are expected to accept the first offer that passes their reservation threshold, the observed heterogeneity of product-decision incidence is explained by shifts in decision-makers' reservation thresholds across choice contexts (Goering, 1984, 1986).

For example, in some reservation utility models consumers update their reservation utilities based on the options they encounter (e.g., Karni and Schwartz, 1977). Some theorists posit that observed options give information about the likely distribution of as-yet-unseen options (e.g., Goering, 1984, 1986; Wernerfelt, 1995). That is, observing both an attractive A and an

attractive C could cause reservation utilities to rise more than would follow from just seeing A alone. Thus, differential learning is posited to induce taste heterogeneity across time.

Principle of value maximization. The major assumption underlying economic theory and standard choice theory is that decision-makers choose the option that maximizes value as they define it. Thus, the decision to defer product choice is normative only if the benefits of maintaining the status quo by foregoing product acquisition outweigh the benefits of product choice during a current choice event. Hence, adding similar option C to {defer,A} should not decrease buying-product-choice incidence.

Search theory. Economists studied choice situations allowing for deferral buying decisions under the general rubric of search theory and incorporated the cost of search into the utility function (e.g., Karni and Schwartz, 1977; Rothschild, 1974; Shapiro, 1983; Telser, 1973). Consumers were expected to continue searching for a better deal as long as the perceived product-benefits exceeded the aggregate cost of the product's price, the search costs already accumulated, and the cost of continuing the search process (Karni and Schwartz, 1977). Karni and Schwartz argued that a successful search process increased choice deferral but that reservation utility could stabilize when consumers were sufficiently familiar with the product class thereby decreasing their choice deferral.

Behavioral perspective

Economists' work on search theory and Corbin's (1980) work on decision incidence remained quite separate from mainstream research on behavioral decision-making and consumer choice for almost a decade. Recently, however, quantitative (e.g., Olson and Swait, 1995) and behavioral researchers (e.g., Dhar, 1996a, b; Greenleaf and Lehmann, 1995; Tversky and Shafir, 1992a) have begun to examine how decision processes and outcomes differ when consumers are faced with a free-choice set.

In all research of this type, the main focus has been on whether changes in the choice context significantly alter buying-product-decision incidence with scant attention paid to relative

product-preference when the defer option is paired with more than one product, e.g., {defer,A_{Med},C_{Hi}}.[2] Two major explanations have emerged for reported changes to buying-product-decision incidence due to changes in choice set composition: decision difficulty (Tversky and Shafir, 1992a) and value uncertainty (Dhar, 1996a).

Impact on product-decision incidence due to increasing the size of free-choice sets

Increasing the choice set increases decision difficulty. The addition of C to {defer,A} forces buyers to perform an explicit tradeoff across attribute types. Several researchers posit that consumers find choice tasks requiring an explicit attribute tradeoff to be very difficult (e.g., Dhar, 1966b; Kiesler, 1966; Miller, 1944; Shepard, 1964; Simonson and Tversky, 1992; Tversky and Shafir, 1992a). This difficulty appears to increase when the options are descriptively dissimilar but are similar in degree of attractiveness (Dhar, 1996a).

Researchers suggest that the difficulty of the task tends to increase choice deferral because it may cause confusion (e.g., Scholnick and Wing, 1988) or conflict (e.g. Tversky and Shafir, 1992a; Tyebjee, 1979). For example, Tversky and Shafir (1992a) show that product-decision incidence decreases significantly when buyers choose from {defer,A,C} instead of from {defer,A}, i.e., P(defer|A,C) > P(defer|A).

As a result, researchers hypothesize factors facilitating decision-making should reduce conflict and choice deferral (e.g. Dhar, 1996b; Montgomery, 1989; Tversky and Shafir, 1992a). They surmise the following circumstances decrease conflict by making choice easy (also see Payne, Bettman, and Johnson, 1992): (a) when one product dominates the other (e.g., Ariely and Wallsten, 1995; Dhar, 1996a; Huber et al., 1982; Simonson, 1989; Montgomery, 1987, 1989; Tyebjee, 1979); (b) when consumers have high product preferences (e.g., Mishra, Umesh, and

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2 Choice of defer implies a preference for obtaining 0 benefits during the current choice event. Thus, defer always represents the lowest possible benefit position in any free-choice set. For example, in free-choice set {defer,A,C}, the A brand has a lower level of benefit than the C brand but in terms of benefit position, A is intermediate between the lowest position at defer and the highest benefit position at C as indicated by their subscript.

Stem, 1993), or (c) when consumers have high product-class knowledge (e.g., Kotovsky and Simon, 1990; Mishra, et al., 1993).

Dhar (1996a) concurs with Tversky and Shafir (1992a) in two important conclusions. The composition of the choice set has a pervasive effect on buyers' tendency to reject all available product offerings, and their results are inconsistent with the standard theory of choice's principle of value maximization.

Addition of a similar option to a free-choice set increases value-uncertainty. Dhar (1996a) disagrees with Tversky and Shafir's (1992a) difficulty explanation for the increased preference for the deferral option in {defer,A,C} versus in {defer,A}. Instead, he attributes such regularity violations to consumers' uncertainty about their own values. To support his position, Dhar reports a study wherein he varied the number of tradeoffs (2 or 4) that had to be completed in sets of type {defer,A,C} with both options similarly attractive, i.e., $P(A_{buy}|defer) \approx P(C_{buy}|defer)$. Dhar found the number of tradeoffs did not have a significant effect on the buying-product-decision incidence, casting doubt on the difficulty explanation advanced by Tversky and Shafir (1992a).

Similarity effect. Adding C to choice set {defer,A} yields {defer,A,C}. The impact the introduction of C is expected to have on P(defer|A,C) can be compared to the similarity effect (Tversky, 1972). A classic similarity effect example is the case of adding "GreenBus" to a set of transportation options {Car,BlueBus}, where the addition of GreenBus only impacts the choice shares of the similar BlueBus. Just as P(Car|BlueBus) would be expected to equal P(Car|BlueBus, GreenBus}, so one might expect P(defer|A) to equal P(defer|A,C) when A and C provide similar benefits. Moreover, substituting "GreenBus" with "RedBus" should not impact the proportion choosing car as their mode of transportation, i.e., P(Car|BlueBus,GreenBus) should equal P(Car|BlueBus,RedBus). Analogously, P(defer|A,C) should equal P(defer|A,B) when A, B, and C provide similar benefits. This effect on buying-product-choice incidence is evident in results presented in the literature (e.g. Dhar, 1996a) and will be covered in greater detail in Chapter 2.

Context effects on decision strategies

Status quo bias. Previous research has concluded that a strong bias for the status quo should be the modal behavior across buying and selling transactions because transaction "losses" will invariably matter more to people than transaction "gains" (e.g., Kahneman, 1992; Kahneman et al., 1990; Knetsch, 1992; Knetsch and Sinden, 1984, 1987; Samuelson and Zeckhauser, 1988; Tversky and Kahneman, 1991). That is, the sellers' loss of their product-assets and the buyers' loss of their money-assets should carry a greater weight than their corresponding transaction gains: the sellers' acquisition of revenue-assets and the buyers' acquisition of product-assets.

Transaction perspective: buying versus selling. Preference reversals due to changes in the choice situation are well documented (e.g., Birnbaum and Stegner, 1979; Kahneman et al., 1990; Mellers et al., 1992; Tversky and Kahneman, 1991). Theorists surmise preference reversals are due to changes in consumers' decision strategies engendered by situation-specific variables (Payne et al., 1992). A buying context is assumed to elicit a strategy that maximizes product-benefits (e.g., Kahneman et al., 1986; Shafir, 1993; Tversky and Kahneman, 1991; Winer, 1986). Conversely, in a selling context decision-makers are assumed to minimize the loss of currently held assets (Kahneman et al., 1986; Knetsch and Sinden, 1984, 1987; Tversky and Kahneman, 1991; Winer, 1986). These proposed tendencies are posited to lead to asymmetries in the valuation of goods by sellers and buyers studied under the classification of endowment effects (e.g., Kahneman et al., 1988, 1990; Knetsch, 1989, 1992; Knetsch and Sinden, 1984, 1987).

Endowment effect. According to the endowment effect (Thaler, 1980), the maximal amount buyers will be willing to pay to obtain an asset is much smaller than the minimal amount sellers will be willing to accept to give up the same asset. Theorists explain the buyer-seller discrepancy in terms of loss aversion--losses are more painful than gains are pleasurable (e.g., Kahneman and Tversky, 1979, 1983; Tversky and Kahneman, 1991; Kahneman et al., 1990). Kahneman et al. posit obtaining the asset is seen as a gain by the buyer causing buyers to undervalue product-benefits; giving up the product-asset is seen as a loss by the seller causing sellers to overvalue product-benefits. The observed asymmetric valuation of goods by buyers and

sellers challenges standard economic theory wherein buying and selling prices are expected to coincide when transaction costs and wealth effects are controlled (Kahneman and Tversky, 1983).

The traditional way of expressing the asymmetric relationship of buyers and sellers is in terms of each group's proactive response: the degree of money-asset seeking by sellers versus the product-benefit seeking by buyers. The endowment effect could be studied within a free-choice-set context by holding free-choice sets constant across selling and buying transactions. For example, at a stated low offer of A for \$1, we expect a significant minority of sellers to be proactive and sell and a significant majority of buyers to be proactive and buy: $P(A_{sell}|\text{defer}) \approx [1 - P(A_{buy}|\text{defer})] < .5$. At a stated high offer of A for \$10, our expectations reverse. Now, we expect a significant majority of sellers to sell and a significant minority of buyers to buy: $P(A_{sell}|\text{defer}) \approx [1 - P(A_{buy}|\text{defer})] > .5$.

Given the above argument, assume a group of buyers is offered personal computer A(PriceA,MemoryA) in {defer,A}. A second group is offered computer C(PriceC,MemoryC) in {defer,C). Computer C's benefits and costs are higher than those of computer A. The same two sets are offered to respective groups of sellers and we obtain the expected asymmetric buying/selling behavior for both computers: $P(A_{sell}|\text{defer}) \approx P(C_{sell}|\text{defer}) \approx [1 - P(A_{buy}|\text{defer})] \approx [1 - P(A_{buy}|\text{defer})] < .5$. These results would indicate that A and C are similarly aversive amongst the buyers while the prices of A and C are similarly attractive amongst the sellers. We estimate the expected product-decision incidence of buying A or C by:

$$(1.1) \quad P(J_{BuyA,C}\,|\text{defer}) = \frac{(buyA + buyC)}{(N_{Ab} + N_{Cb})},$$

where *buyA* and *buyC* are, respectively, the number of buyers acquiring A from {defer,A} or C from {defer,C}; N_{Ab}, and N_{Cb} are, respectively, the total number of potential buyers offered {defer,A} or {defer,C}. Similarly, we estimate the expected decision incidence of selling A or C:

$$(1.2) \quad P(J_{SellA,C}\,|\text{defer}) = \frac{(sellA + sellC)}{(N_{As} + N_{Cs})}$$

where *sellA* and *sellC* are, respectively, the number of sellers disposing of A from {defer,A} or C

from {defer,C}; N_{As}, and N_{Cs} are, respectively, the total number of potential sellers offered {defer,A$}or {defer,C$}. Moreover, we expect $P(J_{SellA,C}|defer) = [1- P(J_{BuyA,C}|defer)]$.

Suppose a group of buyers is given the choice to buy A, buy C, or defer buying either from {defer, A, C} at the same price as before. By the endowment effect, we expect buyers to continue to find both A and C unattractive. Thus, the buying-product-decision incidence from the trinary set, $P(A_{buy}, C_{buy}|defer)$, should not differ significantly from the expected buying-product-decision incidence of A or C: $P(J_{BuyA,C}|defer) \approx P(A_{buy}, C_{buy}|defer) < .5$. Nor should $P(A_{buy}|defer, C_{buy})$ differ from $P(C_{buy}|defer, A_{buy})$. In a similar manner, suppose that a group of sellers is offered set {defer,A,C} and is given the choice to sell A, sell C, or defer selling either. As for the buyers, we expect the selling-decision incidence in the trinary set not to differ significantly from the expected selling-decision incidence of A or C from the binary sets, i.e., $P(J_{SellA,C}|defer) \approx P(A_{sell}, C_{sell}|defer) > .5$ and $P(A_{sell}|defer, C_{sell}) \approx P(C_{sell}|defer, A_{sell})$.

By loss aversion, however, a loss increase is more painful than a corresponding gain increase is pleasurable. Thus, loss aversion implies the desire to maximize gains (revenue) should be less than the desire to minimize losses (disposal of product-benefits). Hence, we should expect a significant difference in the relative preference for keeping A or C from selling set $(defer, A_{sell}, C_{sell})$. That is, sellers willing to sell should give more importance to the product-benefits, preferring to sell low-benefit, low-price A and keep high-benefit, high price, C, to retain the more powerful computer: $P(A_{sell}|defer, C_{sell}) > P(C_{sell}|defer, A_{sell})$. However, if sellers give more importance to the transaction-benefits than to the transaction-costs, they should try to maximize revenues--indicating $P(A_{sell}|defer, C_{sell}) < P(C_{sell}|defer, A_{sell})$.

In addition, note that status quo bias is at odds with the asymmetry in the degree of aversiveness shown by buyers giving up money to acquire products and by sellers giving up consumption goods predicted by the endowment effect. The implications of these competing premises will be explored in greater detail in Chapters 2 and 3, and tested in Chapters 4 and 5.

Context Effects in Forced-Choice

Economic perspective: Independence of irrelevant alternatives (IIA) property

The principle of value maximization implies pairwise product valuation should be independent of the presence of irrelevant alternatives (see Luce, 1957). The IIA property, underlying marketing random utility models, consists of three parts: (a) Product valuation is independent of the presence or absence of other products in the choice set. (b) A pairwise product-choice relationship should be constant across different choice sets. (c) The products' absolute-subjective values are immaterial while the products' pairwise subjective-value differences (e.g., [SValueC - SValueA] are important in terms of the choice probabilities (Ben-Akiva and Lerman, 1985).

This property implies both regularity--[$P(C|A) \geq P(C|A,B)$]--and the constant ratio rule-- $\frac{P(C|A,B)}{P(A|B,C)} = \frac{P(C|A)}{P(A|C)}$. That is, there should be no effect of choice-set composition on a tradeoff pair's relative shares nor on the absolute shares of either member of the original core-pair, [A,C].

Behavioral perspective

Effect on choice due to changes in choice-set size. Product choice has been shown to be significantly affected by the composition of free-choice sets (e.g., Tversky and Shafir, 1992a; Dhar, 1996a). This choice-set effect also has been demonstrated in studies using forced-choice sets (e.g., Huber, Payne and Puto, 1982; Huber and Puto, 1983; Simonson and Tversky, 1992). For example, it has been reported that while the "A" brand is significantly preferred in binary sets of form $\{A_{Lo},B_{Hi}\}$and $\{A_{Lo},C_{Hi}\}$,[3] it tends to be the least preferred when respondents choose from trinary set $\{A_{Lo},B_{Med},C_{Hi}\}$ (e.g., Simonson and Tversky, 1992; Prelec, Wernerfelt, and Zettlemeyer, 1995).

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3 Because of the importance of products' intra-set benefit positions in context effects, options in binary or trinary choice sets will appear subscripted to indicate their within-set relative benefit position when appropriate. In choice sets with non-dominated alternatives, the addition or removal of options may change the relative benefit and cost positions of the constant members of the set.

Some examples of distinct patterns of choice commonly reported in research using forced-choice sets are: (a) Attraction--referring to Figure 1-1--the introduction of low-extreme A to $\{B_{1Lo}, C_{Hi}\}$, yielding $\{A_{Lo}, B_{1Med}, C_{Hi}\}$, increases newly intermediate B_1's absolute shares as well as the B_1-to-C relative-shares ratio in direct violations of the constant ratio rule, regularity, and the similarity effect (e.g., Huber et al., 1982; Huber and Puto, 1983; Ratneshwar, Schocker and Stewart, 1987; Simonson, 1989; Tversky and Simonson, 1993). And, (b) polarization wherein preference shifts from A to high-benefit, high-price C when intermediate B_2 is introduced into $\{A_{Lo}, C_{Hi}\}$, yielding $\{A_{Lo}, B_{2Med}, C_{Hi}\}$, thus violating the constant ratio rule and regularity (e.g., Simonson and Tversky, 1992).

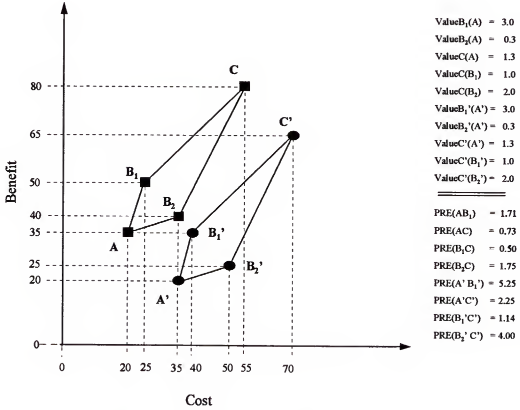

Figure 1-1. According to the local contrast hypothesis, forced-choice sets $\{A_{Lo}, B_{1Med}, C_{Hi}\}$ and $\{A_{Lo}, B_{2Med}, C_{Hi}\}$ are replicates of sets $\{A'_{Lo}, B_1'_{Med}, C'_{Hi}\}$ and $\{A'_{Lo}, B_2'_{Med}, C'_{Hi}\}$, respectively, due to their identical pairwise incremental values, e.g., ValueC(A) = ValueC'(A'). However, according to the proportional rate of exchange hypothesis, these sets are not replicates. Source: Hollman and Lynch, 1997.

Effect of local contrast in trinary choice. In Tversky and Simonson's (1993; Simonson and Tversky, 1992) componential context model, incremental ValueC(A) is viewed as critical to explaining context effects. Trading up from low-benefit A to high-benefit C, incremental Value C(A) is the ratio of the incremental benefit interval A→C to the incremental cost interval A→C and represents the linear tradeoff rate between products A and C:

$$\text{(1.3)} \quad \text{ValueC(A)} = \frac{(BenefitC - BenefitA)}{(CostC - CostA)}.$$

Research by Simonson and Tversky (1992) and other theorists suggests variability in a forced-choice trinary set's three incremental-value rates is a necessary condition to produce context effects such as attraction (e.g., Huber et al., 1982; Huber and Puto, 1983; Ratneshwar et al., 1987; Simonson, 1989; Tversky and Simonson, 1993). Simonson and Tversky posit that in forced-choice sets, such as $\{A,B_1,C\}$ in Figure 1-1, there are three possible incremental-value rates. These incremental-value rates represent the tradeoffs between (a) the intermediate-benefit and low-benefit brands, denoted ValueMed(Lo), e.g., ValueB_1(A); (b) the high-benefit and low-benefit brands, denoted ValueHi(Lo), e.g., ValueC(A); and (c) the high-benefit and intermediate-benefit brands, denoted ValueHi(Med), e.g., ValueC(B_1). These authors conjectured consumers compared these three incremental-value rates to determine their preferred choice. Simonson and Tversky (1992) called this process local contrast. Although as in economic-based models the importance-weights of common attributes are constant across products in the componential context model, local contrast changes the importance weights when at least two of the three incremental value rates differ in trinary sets such as those depicted in Figure 1-1.

For example, Simonson and Tversky hypothesize the local contrast of incremental values in set like $\{A,B_1,C\}$--yielding [ValueMed(Lo) > ValueHi(Lo) > ValueHi(Med)]--produces an "enhancement" effect that "attracts" shares away from extreme option C toward intermediate option B_1 because this comparison shows B_1 to be the best choice. By a similar argument, they surmised that when local contrast yields an opposite incremental-value relationship--[ValueMed(Lo) < ValueHi(Lo) < ValueHi(Med)]--it would "detract" from the attractiveness of

the intermediate option. Forced-choice set {A,B_2,C}, in Figure 1-1, represents an example of this condition . Hollman and Lynch (1997) extended this work by showing that the choice pattern elicited by a choice set depended both on the incremental-value structural form and on the absolute value of the set's lowest- and intermediate-benefit options.

For example, sets {A,B_1,C} and {A',B_1',C'} would be considered replicates according to Simonson and Tversky's conceptualization of local contrast because they have identical incremental-value structures, i.e., their three corresponding incremental values are identical. As I demonstrate in Chapter 3, these two sets are not replicates under relative value theory. Specifically, set {A,B_1,C} would be expected to elicit an attraction-type choice pattern whereas set {A',B_1',C'} would be expected to elicit a polarization-type choice pattern.

Moreover, Simonson and Tversky stated "... in the binary choice [context] there is only one tradeoff, and hence no room for [local] tradeoff contrast..." (1992, p. 288). Consequently, Tversky and Simonson (1993) did not introduce a local context component for choice sets having less than three product-options. Thus, local contrast as conceptualized by Simonson and Tversky (1992) could not be used to explain a significant change in product-choice incidence due to a change in set context from {defer,C} to {defer,A,C} or from {defer,C'} to {defer,A',C'}.

Context effects in binary choice. In the componential context model, incremental ValueC(A) is viewed as critical to explaining context effects due to "background contrast." According to Tversky and Simonson (1992), consumers who have experience choosing from a product class compare the current incremental ValueC(A) to a previously learned incremental-value rate in the same product class, e.g., ValueC'(A'), through a process they term background contrast. When the current incremental-value rate differs from the learned rate, the process of contrasting the two incremental-value rates changes the importance-weights of the products' common attributes.

The only other explicit assumption stated in the componential context model about the options' subjective values is that they conform to the assumptions of value maximization unless background contrast is operational. Consequently, the independence of irrelevant alternatives

property underlying random utility models also underlies the componential context model of binary choice in the absence of context effects.

As a result, there is no distinction between the componential context model's treatment of binary-choice and that of the economic-based discrete choice models (e.g., random utility models) when (a) decision-makers lack experience in selecting brands from choice sets requiring pairwise product valuation, or (b) when a current incremental-value rate is similar to a previously learned incremental-value rate. Thus, background contrast as conceptualized by Simonson and Tversky (1992; Tversky and Simonson, 1993) could not account for a significant change in buying-product-choice incidence when buyers chose from {defer,A} after learning of the existence of similar product C.

Relative value theory perspective

Relative value theory (Hollman and Lynch, 1997) suggests a different way to approach the study of choice that would allow a test of the stability of the choice process across contexts. An important tenet of this theory is that the process of determining a binary-relation measure is consistent across set contexts.

Proportional rate of exchange. Referring to Figure 1-1, proportional rate of exchange (AC)[4] indicates the proportional increase in benefits trading A for C per 1% increase in costs:

$$(1.4) \qquad PRE(AC) = \left(\frac{(BenefitC_{Hi} - BenefitA_{Lo})}{BenefitA_{Lo}}\right) \Big/ \left(\frac{(CostC_{Hi} - CostA_{Lo})}{CostA_{Lo}}\right) = .73$$

That is, trading up from A to C, the proportional increase in benefits is only .73 per 1% cost increase.

The diagnosticity of proportional rates of exchange. Table 1.1 shows the information value of three levels of the PRE measure. In relative value theory, a rate of exchange is perceived to be "fair" if a 1% improvement on a "benefit" dimension (e.g., computer memory) causes one to make a 1% sacrifice on a "cost" dimension (e.g., price). All else equal, a proportional rate of

4 I follow the notation convention of using AC to signify an interval starting at position A and ending at position C. Also note options' subscripts may not appear on graphs since the same options may take on different benefit positions when used to compose different choice sets.

exchange greater than one indicates high-benefit, high-price option is a good deal in a tradeoff pair such as [A',C'] in Figure 1-1 with PRE(A'C') = 2.25. A proportional rate of exchange less than one, such as PRE(AC) = .73 for tradeoff pair [A,C] in Figure 1-1, indicates the incremental benefits obtainable from C may not be worth the incremental cost. In general, increasing levels of PRE heighten consumers' tendencies to opt for a higher-benefit, higher-cost option.

Table 1.1. The diagnostic value of proportional rates of exchange levels for tradeoff pairs of form [A,C] where the A option is lower in benefits than the C option.

PRE(AC) level: *	PRE(AC) < 1	PRE(AC) = 1	PRE(AC) > 1
Diagnosticity level:	Diagnostic	Non-diagnostic	Diagnostic
Significance:	Rate of benefit-unit accrual per cost-unit is lower for benefit interval [AC] than for benefit interval [0A] indicating option C's incremental benefits may not be worth the incremental costs.	Rate of benefit-unit accrual per cost-unit for benefit interval [AC] is equal to that of benefit interval [0A] indicating a "fair" exchange. Preference for C depends on other decision context variables.	Rate of benefit-unit accrual per cost-unit is higher for benefit interval [AC] than for benefit interval [0A] indicating option C's incremental benefits may be worth the incremental costs.

* The PRE(AC) measure indicates the proportional increase in benefits trading A for C per 1% increase in cost (see Equation 1.4).

For example, the incremental values of tradeoff pairs [A',C'] and [A,C] are identical: ValueC(A) = ValueC'(A') = 1.3. However, PRE(AC) = 2.25 indicates that the proportional increase in benefits is 2.25 times the proportional increase in costs trading up from A' to C' while it is only .73 trading up from A to C. Thus, all else equal, the preference for the high-benefit, high-price alternative should be much higher in {A',C'} than in {A,C}.

Relative value relationships in trinary choice sets. Consider trinary forced-choice set $\{A,B_1,C\}$ in Figure 1-1. Hollman and Lynch posit that in a trinary choice set there are three key binary-relations -- $A \rightarrow B_1$, $A \rightarrow C$, and $B_1 \rightarrow C$ -- that yield three proportional rates of exchange -- $PRE(A_{Lo}B_{1Med})$, $PRE(A_{Lo}C_{Hi})$ and $PRE(B_{1Med}C_{Hi})$. These three rates form specific patterns of relative value relationships that determine a trinary forced-choice set's structural configuration. Just like in local contrast (Simonson and Tversky, 1992) these three proportional rates of exchange are compared during the decision-making process to determine the option that maximizes relative value. Hollman and Lynch also provide a typology of structural configurations and cross-reference them to commonly observed patterns of choice elicited using a forced-choice paradigm.

Some examples of structural configurations and their commonly associated patterns of choice are attraction and polarization. Set $\{A,B_1,C\}$ in Figure 1-1 represents a typical attraction linear structure; its PRE-structural configuration is $[PRE(LoMed) \geq PRE(LoHi) \geq PRE(MedHi) \mid PRE(MedHi_i) \leq 1]$. Sets $\{A,B_2,C\}$ and $\{A',B_2',C'\}$ in Figure 1-1 represent polarization linear structures; the PRE-structural configuration for both sets is $[PRE(LoMed) \leq PRE(LoHi) \leq PRE(MedHi) \mid PRE(MedHi) \geq 1]$.

Primary goals and objectives. An additional fundamental element of relative value theory is the importance accorded the primary goals and objectives that motivate a transaction. The perceived transaction's goal is the filter through which the set's relative value relationships are interpreted. Hence, a choice situation's goal dictates attribute prominence (also see Beach and Mitchell, 1987 a, b; Grossberg and Gutowski, 1987; Tversky, Sattath and Slovic, 1988).

Untested Determinants of Choice Deferral

Important implicit assumptions that underlie research on choice deferral include: (a) Attractive options elicit less choice deferral than unattractive ones (e.g. Beach and Mitchell, 1987a, b; Dhar, 1996a). (b) The tendency to opt for the status quo (e.g., the defer option)

increases when available options offer similar utility levels (Beach and Mitchell, 1987a, b; Dhar, 1996a; Scholnick and Wing, 1988; Tversky and Shafir, 1992a). (c) When product-options are similar in level of attractiveness, buying-product-choice incidence decreases either because the decision-making process is more difficult thereby increasing conflict (Tversky and Shafir, 1992a; Payne, Bettman, and Johnson, 1988) or buyers experience value uncertainty (Dhar, 1996a). And, (d) the increased difficulty of the decision-making process when product-options have significant advantages and disadvantages that must be traded off decreases buying-product-choice incidence (Tversky and Shafir, 1992a).

These implicit assumptions have not been thoroughly examined to date. Specifically, these assumptions imply that free-choice sets having similarly unattractive alternatives that require trading off advantages and disadvantages should elicit greater choice deferral than sets having attractive alternatives such as those used by Tversky and Shafir (1992a) and Dhar (1996a). As yet, this implication has not been tested.

Theorists expect sets of form $\{defer, A_{Hi}\}$, $\{defer, A_{Med}, C_{Hi}\}$ and $\{A_{Lo}, B_{Med}, C_{Hi}\}$ should elicit different choice strategies due to the increased level of decision difficulty produced by the addition of products to the choice set (see Payne et al., 1988). However, no tests have been made to ascertain whether the effects of choice set composition on free-choice sets produce patterns of choice resembling those obtained due to compositional changes in forced-choice sets. For example, if the defer option is significantly preferred in sets $\{defer, A_{Hi}\}$ and $\{defer, C_{Hi}\}$ but preference shifts to A in the trinary defer-context $\{defer, A_{Med}, C_{Hi}\}$, an attraction-like choice pattern would be obtained.

Relative Value Analysis of Choice Deferral

Effect of Adding a Second Option to Binary Free-Choice Sets

Relative value theory predicts the purchase of C in Figure 1-2 from free-choice set $\{defer, C_{Hi}\}$ when the product-related benefits are worth the price and the rejection of C when

saving the money is perceived as more valuable than obtaining the product. Conversely, in a sell situation respondents consider whether the amount of revenue due to the sale of C is worth giving up the product-related benefits.

Adding a second product, A, to {defer,C} not only increases the number of options available but, more important, it also increases the evaluative context within which the relative value of C is determined. That is, in {defer,C} there is only one lower-benefit level perspective by which to evaluate product C: defer(0-cost,0-product-benefits) whose value is unity by definition (see Rosen, 1974, Luenberger, 1992). A measure of this relationship for the given example is PRE(deferC) = 0.0040.

In {defer,A_{Med},C_{Hi}}, as in {A_{Lo},B_{Med},C_{Hi}}, there are three key binary relations -- defer→A, defer→C, A→C -- that yield three proportional rates of exchange -- PRE(deferA_{Med}), PRE(deferC_{Hi}), and PRE($A_{Med}C_{Hi}$). Due to the trinary evaluative-context, product C's relative value can be appraised from two lower-benefit level positions: defer(Cost0,Benefit0) and A(CostA,BenefitA). Just as in forced-choice sets, these three proportional rates of exchange form specific patterns of relative-value relationships that determine the set's structural configuration and guide choice.

For example, assume buyers are offered computer options A and C, shown in Figure 1-2, along with the opportunity to defer product choice, yielding trinary defer-set {defer,A_{Med},C_{Hi}}. In this context, option A, a known and available competitor to C, denotes a benefit-position that is intermediate between having none of the product-benefits and none of the cost--defer position at (0,0)--and obtaining the highest available product-benefits at the highest cost--C's position at ($1995,8Meg). Note that the resultant structural configuration for {defer,A_{Med},C_{Hi}} is of type polarization = [PRE(LoMed) ≤ PRE(LoHi) ≤ PRE(MedHi) | PRE(MedHi) ≥ 1], implying that the addition of A to {defer,C_{Hi}} should significantly enhance C's attractiveness.

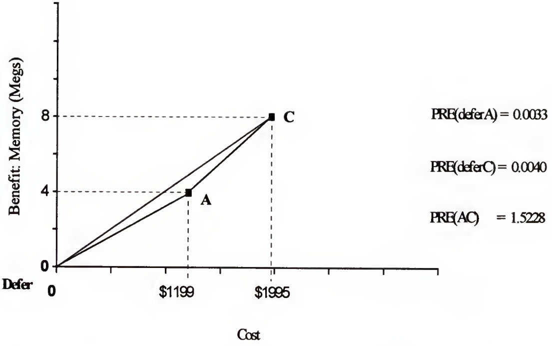

Figure 1-2. Example of trinary free-choice set with a polarization-type structural configuration that favors high-price, high-benefit option C from {defer,A,C}: [PRE(deferA) < PRE(deferC) < PRE(AC) | PRE(AC) > 1].

Explicit Versus Implicit Choice Sets: Differentiating Between Choice Sets and Evaluation Sets

In free-choice set {defer,A_{Med},C_{Hi}}, all relationships are explicit: every benefit position known by the decision-maker is an available choice option. Alternatively, a consumer may gain information about A prior to choosing from {defer,C_{Hi}}. In this case, there are three components in C's evaluation set--E{defer,A_{Med},C_{Hi}}--but only two decision options in the choice set--S{defer,C_{Hi}}. Although only product C is available for choice, the consumer has information on the benefits and costs of both A and C. This yields "implicit" free-choice set {defer,C_{Hi}|[a_{Med}]}. Here, [a_{Med}] denotes that product A is a known but currently unavailable competitor to C whose position is intermediate between "defer" at (0,0) and C at ($1995,8Meg).

This implicit evaluation set's trinary-like structural configuration has three proportional rates of exchange, PRE(deferA_{Med}), PRE(deferC_{Hi}), and PRE($A_{Med}C_{Hi}$), rather than the choice set's simple binary relation, PRE(deferC_{Hi}). The implication is that C's level of attractiveness in implicit trinary set {defer,C_{Hi}|[a_{Med}]} should be similar to its attractiveness in trinary explicit set

$\{defer, A_{Med}, C_{Hi}\}$ and higher than in explicit binary set $\{defer, C_{Hi}\}$. A test of this premise in presented in Chapter 4.

Equivalence of Decision-Making Process Across Choice Contexts

Adopting relative value theory's assumption that the decision process is equivalent across formats suggests a number of testable premises. Below, I enumerate various implications for context effects in free-choice sets depending on the diagnosticity of the set's structural configuration:

1. Context effects when the set's structural configuration is diagnostic: $PRE \neq 1$

(a) Implicit v. explicit set contexts. In a buying situation the pattern of preference for product C due to the introduction of A is similar across explicit and implicit sets.

(b) Free-choice v. forced-choice contexts. The patterns of product-choice across forced-choice and free-choice formats resemble each other when the evaluation sets' structural configurations are held constant.

(c) Transaction perspective: buying v. selling. Keeping explicit choice set $\{defer, A_{Med}, C_{Hi}\}$ constant while varying the transaction perspective from buying to its opposite, selling, produces inverse structural configurations.[5] This is because the buyer's transaction benefits represented by the product's benefits (e.g., computer memory) are the seller's transaction costs. Similarly, the buyer's transaction costs (e.g., price) are the seller's transaction benefits. The difference in transaction focus leads to opposite buying and selling patterns characteristic of endowment effects (e.g., Knetsch and Sinden, 1984, 1987; Knetsch, Kahneman, and Thaler, 1987; Kahneman et al., 1986, 1990). For example, a structural configuration that favors keeping C and selling A from the sellers' perspective would favor buying C and foregoing A from the buyers' perspective.

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5 For example, assume we hold constant computer choice set $\{A_{Lo}, C_{Hi}\}$, with options described in terms of memory and price, while varying the transaction context from buying to selling. Because the buyers' benefits and costs are the inverse of the sellers' benefits and costs, $PRE(A_{Lo}, C_{Hi})_{buy} = PRE(A_{Lo}, C_{Hi})_{sell}^{-1}$.

Moreover, I hypothesize that when respondents are able to use the relative value relations represented by the set's structural configuration to guide choice, transaction perspective (buying versus selling) will have a predictable effect on the choice pattern while choice-set-format (free-choice versus forced-choice) will not have an effect. Both buyers and sellers will focus on maximizing their respective relative values.

2. Context effects when the set's structural configuration is non-diagnostic: PRE = 1

(a) Free-choice context. The conservative attitude fostered by the free-choice situation (Beach and Mitchell, 1987a, b) causes buyers and sellers to focus on the minimization of their opposite transaction costs. That is, sellers should try to minimize giving up their asset-benefits while buyers should try to minimize expenditures of money.

As a result, buyers should prefer to buy at a low price even when doing so represents a considerable loss in quality. Sellers should prefer to keep a higher quality asset even when keeping it represents a considerable revenue loss. Hence, the endowment effect should not occur when the task goal itself is ambiguous, as in free-choice sets, and respondents are unable to guide their choice by using the evaluative set's structural configuration to guide choice.

(b) Forced-choice context. Due to the high product-decision-urgency implied by forced-choice contexts, this choice format fosters a proactive attitude that causes buyers and sellers to focus on the maximization of their opposite transaction benefits. Sellers should try to maximize revenue. Hence, sellers should prefer to keep a lower quality asset and dispose of a higher quality one that generates higher revenue. Conversely, buyers should try to maximize product-benefits. Thus, buyers prefer to buy high quality even when it represents a substantial price increase. Thus, sellers should want to sell C and buyers should also desire to buy C from $\{A_{Lo}, C_{Hi}\}$.

Organization of the Dissertation.

A central thesis of this dissertation is that a proportional-rate-of-exchange-relation approach to the study of preference can account (a) for observed choice deferral data for

attractive options; (b) for opposite results in choice deferral when the product options are unattractive; and (c) for changes in selling and buying choice patterns as a function of the evaluative-set's structural configuration or of the choice-set's format.

In Chapter 2, I provide an overview of pertinent economic and behavioral literatures. Chapter 3 starts with a review of the basic concepts of relative value theory and goes on to a more in-depth analysis of concepts that are germane to the goals of the dissertation. Chapter 4 presents an experiment designed to test several premises expected to hold when buyers choose from free-choice sets composed of <u>unattractive</u> products (e.g., $P(A_{Hi}|defer)$ or $P(C_{Hi}|defer) < 0.50$). Chapter 5 shows a replication of several premises tested in Chapter 4 using the same product choices but changing the transaction to selling. These tests show that varying the situation context from buying to selling also inverts the perceived set's structural configuration and leads to product preference invariance across transaction conditions that leads to a reluctance to trade. Chapter 6 presents an experiment showing the effect of changing the choice-set format from forced-choice to free-choice on the choice pattern when the product binary relation is held non-diagnostic [i.e., $PRE(AC) = 1$]. To close, Chapter 7 provides a general discussion of experimental results as well as implications for marketing management and theory.

CHAPTER 2
REVIEW OF RELEVANT ECONOMIC AND BEHAVIORAL DECISION RESEARCH

Overview

Most principles and concepts used in both economic and behavioral perspectives to understand choice behavior in a free-choice context have been derived from research using a forced-choice paradigm. Some of these concepts are now being applied to free-choice behavior and have led to competing explications. Economic and behavioral decision researchers differ in their explanations of what drives preference when decision-makers feel free to defer product-choice. Thus, I first review economic and behavioral forced-choice research that is relevant to examining these two perspectives' currently proposed determinants of product-choice in free-choice contexts. Subsequently, I compare and contrast economic and behavioral free-choice research. Then, I summarize the areas of concurrence and disagreement in this research. I conclude by proposing a research agenda using relative value theory that can distinguish among the explanations and can reconcile contradictory choice behavior.

Preference Rank-Ordering of Choice Options

Study of Preference Through Forced-Choice Analysis

In the canonical model of decision-making, the preference relation of two options, A and C, depends on the result of a comparative judgment of each option's perceived utility (Thurstone, 1927). Utility is an index measure of an option's attractiveness in terms of its component attributes that results from decision-makers' comparison of different options (Ben-Akiva and Lerman, 1985). This comparative process allows individuals to perform a weak preference rank-

ordering of available alternatives that determines the elicited pattern of choice (see Antonides, 1989; Edwards, 1954; Luce, 1959; Nosofsky, 1992). That is, the choice of C from forced-choice set {A,C}, where C has higher benefit and cost levels, implies that C has higher utility than A in the decision-maker's preference order. Aggregating over individuals, we denote the magnitude of the proportion of consumers choosing C from {A,C} as P(C|A). The magnitude of this measure indicates the strength of the preference of C over A (Simonson and Tversky, 1992). Conversely, the pattern of choice is taken to be a direct reflection of each option's underlying utility (Adamowicz, Louviere and Williams, 1994; Halldin, 1974; Parker and Maynard-Smith, 1990; case V of Thurstone, 1927; Samuelson, 1938b, 1948, 1965). Thus, one surmises C has greater utility than A when a greater proportion of consumers choose C over A, i.e., $\frac{P(C_i|A)}{P(A|C)} > 1$. One surmises A and C have similar utility levels when consumers choose at random from {A,C}, i.e., $\frac{P(C|A)}{P(A|C)} \approx 1$.

Relationship of Utility Rank-Order and Choice Pattern

Economic perspective. In the absence of transaction costs or income effects, the above constant utility assumption--underlying most economic theory and marketing models--suggests that a set of options' rank-order should be invariant across contexts or elicitation procedures and should lead to consistent, i.e., transitive, product choice.

Behavioral perspective. In contrast, contemporary behavioral decision theory assumes that consumers lack well-defined product preferences and that preferences are constructed during the decision-making process (e.g., Fischhoff, Slovic, and Lichtenstein, 1980; Feldman and Lynch, 1988; Johnson, Payne, and Bettman, 1992; Shafer and Tversky, 1985; Shafir, 1993; Slovic, 1995; Tversky et al., 1988). The assumptions underlying behavioral decision research imply that product preferences revealed through choice reflect a utility rank-order of the options that is relative and contextual and that, not surprisingly, may lead to inconsistent, product choice.

Relative value theory perspective. More recently, Hollman and Lynch (1997) have presented relative value theory as a paramorphic model of how inputs to behaviorally relevant decisions are processed by consumers during a choice event. They posit that a binary preference relation of same-category options depends on relative value.

Relative value is a measure of relative attractiveness wherein marginal units of incremental value obtainable at a higher benefit, higher cost option, are indexed to the value obtainable at a lower benefit, lower cost option. This research suggests that the process of determining a binary relative value measure is consistent across contexts.

In accord with extant behavioral decision research, relative value theory assumes that preferences are constructed during the decision-making process. However, under relative value theory, intra-set product preference depends on the products' relative value relationships. A particular option is preferred whenever the set's relative value relationships indicate that it has the highest relative value. Consequently, the utility rank-order of the options is expected to be relative and contextual while the choice patterns are expected to be consistent in terms of the relative-value relational structure. These concepts are given a more in-depth treatment in Chapter 3.

Currently Proposed Determinants of Product Choice in Forced-Choice

Economic Perspective

Core concepts

Individual preference drives individual demand for specific products and services. The aggregation of individual demand schedules constitutes market demand. Accordingly, individual preference is at the core of the modern microeconomic theory of choice (Pudney, 1989). Underlying individual preferences are the concepts of consumer surplus, willingness-to-pay, marginal utility, and diminishing marginal utility (e.g., Kreps, 1990; Luenberger, 1992;

Wonnacott and Wonnacott, 1982). Thus, they are central to the economic analysis of the determinants of product choice.

Relationship of willingness-to-pay, consumer surplus, and marginal utility. Marginal utility is the incremental net benefit derived from the consumption of one additional unit of a good or service. For example, the marginal utility derived from the consumption of the first unit of product A may be represented by:

$$(2.1) \qquad dU_A = \frac{(U_A - 0)}{(1Aunit - 0)}.$$

Perceived marginal utility affects reservation utility through a learning and adjustment process. For example, for constant price, a consumer who has consistently realized marginal utility dU_A from consumption of product A in the past would likely reject product C if its expected marginal utility, dU_C is less than dU_A. Perceived marginal utility indirectly sets reservation price by affecting a consumer's willingness-to-pay.

Willingness-to-pay (WTP) refers to the incremental cost one is willing to incur to obtain an additional product-unit such that the perceived change in utility is at least equal to the perceived change in costs for a fixed level of income. For example, consumers' willingness-to-pay to purchase their first unit of product A relates the change in utility derivable from consuming the first unit of A to the change in price due to the acquisition of one unit of A:

$$(2.2) \qquad WTP(A) = \left(\frac{\left[(U_A - 0)/(1Aunit - 0)\right]}{\left[(PriceA - 0)/(1Aunit - 0)\right]} - 1 \right) \geq 0.$$

That is, consumers are willing to pay to acquire their first unit of A only when A's utility at least equals its price (WTP(A) = 0) or when its utility is greater than its price (WTP(A) > 0). Specifically, the maximum amount consumers would be willing to pay corresponds to the level of utility they expect to realize from consuming A: $WTP_{max} = f(\text{UtilityA})$.

This presumed correspondence between potential expenditure and expected marginal utility has received analytic support (e.g., Crouzeix, 1983; Diewert, 1982; Luenberger, 1992; Martinez-Legaz, 1991, 1993; Martinez-Legaz and Santos, 1993). Moreover, it has been

fundamental in the development of the reservation (utility or price) threshold concept and the use of products' demand schedules to approximate the products' marginal utilities (Harberger, 1971).

In this context, a product's attractiveness can be expressed in terms of the "consumer surplus" concept. Consumer surplus (CS) is the amount of excess utility accrued to consumers when the maximum amount they are willing to pay for product A exceeds A's market price--i.e., CS(A) = WTP(A) > 0. Said another way, buyers enjoy a consumer surplus anytime a product's price falls below that product's expected utility level. Consumers are expected to purchase a product that, at worst, elicits a willingness-to-pay (WTP(A) = 0) or, at best, offers consumer surplus (CS(A) = WTP(A) > 0).

Stated more generally, a product is "attractive" when the marginal net-benefit expected from product consumption exceeds or equals the cost of obtaining it. We can imagine, however, that some products' expected marginal net-benefits fall below their costs making them "aversive" products. This would define a case of consumer deficit wherein there is an excess of costs leading consumers to reject the aversive product.

Diminishing marginal utility. The correspondence between marginal utility and willingness-to-pay is related to another fundamental primitive of choice behavior (Edwards, 1957; Lopes, 1994; March, 1996): diminishing marginal utility--consumers' perceived marginal utility decreases with each additional unit of product A consumed. That is, the utility of any good is a monotonically increasing, negatively accelerated function of the amount of that good (Samuelson, 1938a). As a result, buyers' perceived consumer surplus decreases with increasing consumption for a product offering consumer surplus and constant price. Conversely, the demand for most products decreases when utility is constant but price is increasing.

Variable utility of money. The willingness-to-pay concept implies the utility of money depends on the utility of goods for which money can be exchanged (Kreps, 1990; Tversky and Kahneman, 1991; Rosen, 1974). Consequently, the choice of A from {defer,A}, where A is described in terms of a benefit and a cost, is assumed to implicitly represent the decision between

purchasing A or any other feasibly obtainable good such that consumers maximize their marginal utility (Rosen, 1974).

This assumption along with the diminishing marginal utility assumption implies the marginal utility of money is variable. For example, assume product A's price decreases. This allows buyers to increase their purchases of other goods, which, in turn, diminishes such goods' perceived marginal utility. As a result, the utility of money falls and A appears more attractive. However, when A's price increases, buyers must decrease their purchase of other goods, which increases the goods' marginal utility. Thus, the utility of money rises thereby causing A to seem an aversive product.

Utility maximization principle. The classical theory of choice assumes that consumers have stable taste preferences and maintain a weakly ordered set of product-options in terms of their preferences (Edwards, 1954). In addition, consumers are assumed to be rational decision-makers who attempt to maximize utility. Thus, choices are expected to be reflective of consumers' underlying, stable product-preferences.

Independence of irrelevant alternatives (IIA) property. Constant utility in conjunction with the principle of utility maximization implies the probability a consumer chooses an option is solely dependent on the comparison of its net utility to that of any other option under consideration. In Luce's (1959) "choice axiom" the presence or absence of other alternatives in the choice set under consideration is presumed to be irrelevant to a tradeoff pair's preference relation (Luce, 1959). From this assumption we obtain the independence from irrelevant alternative (IIA) property and the constant ratio rule which are special cases of the order independence property as shown by Tversky (1972); namely, if

(2.5) $P_i, (C|A,B) \geq P_i, (A|B,C)$

then

(2.6) $P_i, (C|A) \geq P_i, (A|C)$.

That is, if decision-maker *i* prefers C to A in expanded set {A,B,C}, he is expected to prefer C

over A in the restricted set {A,B}. Note this preference relation is restricted to be a constant ratio under the IIA property. Further, Tversky (1972) showed that if the order-independence property holds, the choice probability for A solely depends on the difference between its utility and the utility of any other available product-choice.

The validity of the IIA property can be shown to be restricted to choice sets with distinct alternatives (Ben-Akiva and Lerman, 1985). Figure 2-1 shows a schematic representation of a typical example identified by Tversky (1972) as the similarity effect. Commuter *i* chooses to go to work by car 50% of the time and prefers to ride a blue bus the other 50% of the time. Addition of a similar "green" bus to our commuter's choice set would change the ratio of the probability of choosing car over blue bus due to the similarity effect--the introduction of green bus competes directly with blue bus, not with the dissimilar car option.

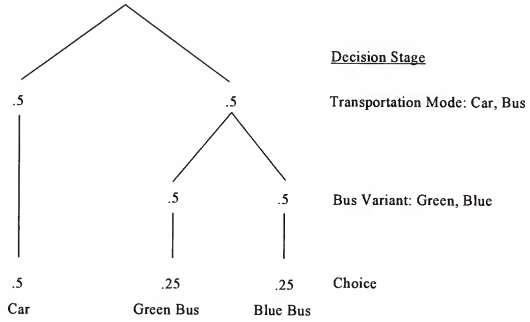

Figure 2-1. Assuming a hierarchical decision-making strategy, the probability that a commuter chooses BlueBus from {Car,GreenBus,BlueBus} equals the probability that public transportation is chosen (.5) times the probability of choosing BlueBus over GreenBus (.5): .5 x .5 = .25.

For example, assume the commuter follows a hierarchical decision-making strategy when choosing from the expanded choice set and that he is indifferent between the two buses. Then, the commuter's expected probability of choosing BlueBus depends both on the probability of choosing TransportationMode times the probability of choosing the BlueBus variant: .5 x .5 = .25. Thus, the expected probability for the three alternatives in {Car,BlueBus,GreenBus} would be: P_i(Car) = .5, P_i(BlueBus) = .25 P_i(GreenBus) = .25. Note, though, that the commuter still would be expected to choose the public mode of transportation half of the time over the private mode (P_I (BlueBus or GreenBus|Car) = 50%) as before so that $\frac{P_i(Car|\,BlueBus)}{P_i(Car|\,BlueBusorGreenBus)} = 1$.

Thus, the less strict order-independence property does hold for this example.

Extension of core concepts to differentiated goods within a product class.

Defining preference over attributes. Products within a product class share a multitude of intrinsic or common attributes that consumers perceive as valuable to the accomplishment of some intended goal. Lancaster (1966) proposed product attributes, not the products themselves, are the carriers of utility. Thus, preferences should be defined over attributes. Hence, the levels of these characteristics, given the transaction goal, should be the inputs to the consumer's utility function.

Objective versus subjective product value. Defining preferences over attributes signifies that derived utility has two components (Lancaster, 1966). A variable amount, *Attribute(x_j)*, that depends on the objective functional attribute level present in the product. For constant price, increases in the levels of "positive" attributes (e.g., attributes that aid in goal attainment) or decreases in the levels of "negative" attributes (e.g., attributes that hinder goal attainment) are expected to raise a product's value. A product's objective value is defined as:

$$(2.3)\qquad \text{ValueA} = \frac{\sum_{j=1}^{J} Attribute(x_j)}{priceA}$$

$$= \frac{(\sum PositiveAttributes - \sum NegativeAttributes)A}{priceA} = \frac{NetBenefitA}{priceA},$$

where price is used as the common scaling factor. An example of the use of this concept is the display of products' unit prices in grocery stores.

The second component is a coefficient, $\pm\lambda$, per attribute x_j that captures an attribute's contribution to the accomplishment of the task goal is constant across products (see Lancaster, 1966; Ben-Akiva and Lerman, 1985; Tversky and Simonson, 1993). Incorporation of this term in the value function yields <u>subjective value</u>:

$$\text{(2.4)} \quad \text{SValueA} = \frac{\sum_{j=1}^{J} \lambda_j Attribute(x_j)}{priceA} = \frac{SubjectiveNetBenefitA}{priceA}.$$

There are three implicit assumptions in the use of the subjective value measure. (a) Consumers are able to separate products by product class. (b) Market price and subjective value are related through the willingness-to-pay concept. And, (c) consumers' definition of "best value" in one product class does not affect their definition of "best value" in another product class (see Hauser and Shugan, 1983; Hauser and Simmie, 1981; Lancaster, 1971; Srinivasan, 1982).

<u>Advantage of value-concept for understanding inter-brand competition</u>. One advantage of the value concept is that it allows the placement of brands within a metric product-space to facilitate the understanding and modeling of inter-brand competitive interactions (e.g., Hauser and Shugan, 1983). For example, Figure 2-2 shows the objective value relationships for the personal computers from forced-choice set {A1,C1}.

Note the computers' locations on iso-value vectors. An <u>iso-value vector</u> shows the various combinations of memory and price having the same objective benefit-to-price ratio. Thus, the slope of the line connecting the origin (0,0)--representing having none of the memory and incurring no cost of acquisition--with a computer's memory and price coordinates represents that computer's objective value. Each option's value term is scripted with "(0)"--e.g., ValueA1(0)--to signify the magnitude of each option's objective value depends on the ratio of a 0→Option-benefit interval to a 0→Option-cost interval. For example, A1's objective value indicates it offers .50K/\$1 (=1024K/\$2048).

It is assumed that the probability that A1 is chosen solely depends on the difference between its value and the value of any other available product-choice. Hence, all computers whose benefit-cost positions locate them on value-vectors to the right of A1's value-vector should be less preferred because they offer lower memory/dollar rates than A1, e.g., [ValueC1(0) - ValueA1(0)] = -.09.[1] Similarly, all computers located on value-vectors to the left of A1's value-vector should be preferred to A1 because they offer higher memory/dollar rates than A1.

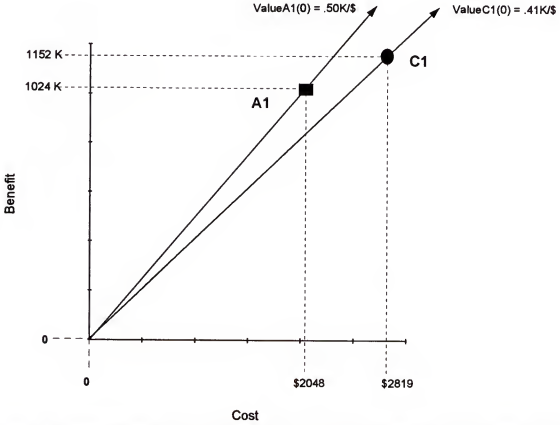

Figure 2-2. Brands of personal computers shown in terms of the benefit and cost levels as well as their objective values: ValueA1(0) = 1024K/$2048 = .50K/$; ValueC1(0) = 1152K/$2819 = .41K/$ ($P(A1|C1) = .78$, $Z_{ho: P(A1|C1) > .5} = 2.02$, $p < .05$). Source: Hollman and Lynch, 1997.

Equating consumer surplus and market share. The willingness-to-pay concept indicates that consumers incur costs to obtain a product only up to the level of the product's expected

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[1] Empirically, a significant majority of respondents chose A1: $P(A1|C1) = .78$, $Z_{ho: P(A1|C1) > .5} = 2.02$, $p < .05$.

marginal utility (see Equation 2.2). The value where benefit and cost are equal and willingness-to-pay is present but there is no consumer surplus is defined as $Value_o = 1$ (Luenberger, 1992; Rosen, 1974). $Value_o$ is used as the referent vector by which a product's value is compared when consumers contemplate whether to acquire the attributes represented by the product's category (see Kreps, 1990; Luenberger, 1992).

A product's market share is the proportion of consumers choosing that product from a choice set and is a measure of an option's aggregate attractiveness (Simonson and Tversky, 1992). The closer a product's market share approximates 1.0 the greater the consensus and the more assured we are of surmising the product offers consumer surplus. For example, suppose buyers contemplate whether to purchase computer A1, in Figure 2-2, or none. When $\frac{P(A1|[0,0])}{P([0,0]|A1)} \approx 1$, we surmise that buyers appear indifferent toward obtaining A1 or maintaining the status quo [position (0,0)], i.e., $SValueA1 \geq Value_0$ for at least 50% of the buyers. On the other hand, the choosing of A1 by a significant majority, yielding $\frac{P(A1|[0,0])}{P([0,0]|A1)} > 1$, suggests A1 is an attractive product that offers a consumer surplus to a significant majority of buyers, i.e., $SValueA1 \geq Value_0$ (see Dhar, 1996a). Similarly, the choosing of A1 by a significant minority, yielding $\frac{P(A1|[0,0])}{P([0,0]|A1)} < 1$, indicates A1 is an aversive product that may offer a consumer deficit to a significant majority of buyers, i.e., $SValueA1 < Value_0$.

Forecasting aggregate demand from individual choice. Because predicting one individual's choice behavior is of little practical use for formulating marketing strategy, marketing models attempt to forecast aggregate demand. An immediate problem is that the IIA property assumption underlies most popular marketing models. The IIA property implies stable taste preferences. Unfortunately, it may not hold in aggregate choice even when it holds for each decision-maker (Ben-Akiva and Lerman, 1985).

One reason the IIA property may not hold in the aggregate is taste heterogeneity in the population--subgroups of buyers may have systematic variations in their taste parameters. The key insight is that the probability of choosing from a product class or of choosing a particular

product class variant may differ across the segments, especially when there is variability in the effective choice sets. To counteract this problem, hierarchical choice models such as the nested logit model have been developed that assume consumers follow hierarchical decision-making strategies. An example is the transportation selection decision schema shown in Figure 2-1 in which the IIA property holds for each decision level. Recovery of the aggregate choice pattern by a nested model is taken as an indication that the IIA assumption holds for choice from the full choice set (McFadden, Tye, and Train 1977; Ben-Akiva and Lerman, 1985). An example is the nested model shown in Figure 2-1 with full set {Car,BlueBus,GreenBus} and restricted subsets {Car,BlueBus}, {Car,GreenBus}, or {BlueBus,GreenBus}. I will come back to this important issue in a subsequent section of the chapter.

Effect of learning

Reservation threshold variability. Another change to the classical viewpoint is the incorporation of learning. Consumers may use observations of market offerings to revise their knowledge of product distribution in the market place for a particular product category (e.g., Goering, 1984; Goering, 1986; Wernerfelt, 1995). When learning is present, consumers' reservation thresholds may no longer be stable. Rather, they may be adjusted according to information gained during consumption or during search (e.g., Goering, 1986; Karni and Schwartz, 1977; Kohn and Shavell, 1974; Rothschild, 1974; Fishman, 1996). Thus, all else equal, experiential differences induce taste heterogeneity.

For example, buyers are expected to adjust their expectations of quality after having made an observation from a product class (Prelec, Wernerfelt, Zettlemeyer, 1995; Wernerfelt, 1995). A product's quality level refers to its perceived net-benefit level. Hence, when buyers perceive the level of current product quality to be higher than the average quality experienced by them in the past, they should be more willing to pay a higher price for the product (Goering 1984, 1986). This increases the probability that a higher quality, higher price alternative is chosen in the current period (Goering 1984, 1986; Shapiro, 1983). Thus, consumers should be more willing to

purchase high-benefit, high-price C1, in Figure 2-2, after having experienced low-benefit, low-price A1.

In order to simplify the analysis, however, economic models generally explore changes in only one of the following: (a) the reservation utility due to quality heterogeneity (e.g., Goering, 1985; Shapiro, 1983); (b) the reservation price due to product homogeneity and price variability (e.g., Fishman, 1996); or (c) changes to the reservation threshold when marginal utility is constant (e.g., Kreps, 1990).[2]

Variable product value. Prelec et al. (1995) experimentally measured whether contextual information affected consumers' judgment of products' locations in benefit-price space, thereby affecting the products' value levels. Changes in choice set composition appeared to change the products' subjective value address. Thus, Prelec et al. surmised that consumers relied on contextual information to infer relative product value.

Prelec et al.'s finding is in general agreement with extensive research that has used a behavioral perspective to study choice processes. Specifically, Prelec et al.'s finding is consistent with behavioral research demonstrating that context affects choice by changing the mental representation of attribute levels (e.g., Lynch, Chakravarti, and Mitra, 1991). In the following section, I review research dealing with the various behavioral theories intended to explain the relative and contextual nature of preference formation and choice.

Behavioral Perspective

Context effects

Context effects are significant changes to relative product preference due to changes in theoretically irrelevant variables such as components of the decision task or of the choice set. Context effects are important. If an option's attractiveness depends on the decision and choice set

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[2] For an exception see Wernerfelt's (1995) rational analysis of the "compromise effect" (Simonson, 1989).

contexts and not on the magnitude of its "context-free" utility, fundamental principles of the classical theory of choice are violated.

One important principle that has been repeatedly violated is that of regularity--the addition of an item to a choice set cannot increase the probability of choosing a member of the original set. Violations of this principle imply that the subjective utility scale is unstable (Payne, Bettman, and Johnson, 1992).

Task components shown to affect preferences include the severity of decision conflict, the response mode (e.g., a buying versus selling task), the degree of uncertainty about values or about decision outcomes, and the ambiguity of the task goal (for review see Payne, Bettman, and Johnson, 1992). Choice set variables identified as affecting preference formation include (a) the size and composition of the choice set (e.g., Ariely and Wallsten, 1995; Hollman and Lynch, 1997; Huber, Payne and Puto, 1982; Huber and Puto, 1983; Simonson, 1989; Simonson, Nowlis and Lemon, 1993; Simonson and Tversky, 1992; Tversky and Simonson, 1993; Wedell, 1991, 1993) and (b) the degree of option similarity (e.g., Dhar, 1996a; Tversky and Shafir, 1992a).

This research suggests that instead of reflecting an underlying constant-utility-scaled, value-rank-order of the options, choice is a consequence of a process through which a relative and contextual utility scale is constructed during the decision-making process (e.g., Payne, Bettman and Johnson, 1992; Payne, Bettman, Coupey, and Johnson, 1992; Slovic, 1995).

Contingent selection of decision-making strategy

Researchers propose decision makers use a variety of methods or strategies contingent on the characteristics of the decision situation, on choice set composition, on task goal, or on degree of expertise (e.g., Abelson and Levi, 1985; Bettman, Johnson, Luce, and Payne, 1993; Payne, 1982; Payne, Bettman and Johnson, 1988; Payne et al., 1992; Shantaeau, 1988; Westenberg and Koele, 1992). Some strategies are "compensatory" or quantitative-like, where options' good and bad aspects are traded off. Other strategies are "non-compensatory" heuristics or qualitative-like. Much of this research has been interpreted as suggesting that decision-makers' use of

compensatory versus non-compensatory strategies depends on such variables as the number of attributes, the number of options, the degree of option similarity, and the difficulty, importance, or ambiguity of the task.

Role of difficulty. Some researchers have surmised changes to a core-pair's share-ratio due to the introduction of a third option into a binary choice set imply decision-makers modify their decision strategy due to the greater complexity of evaluating tradeoffs among three rather than two products (for review see Payne et al., 1992). The empirical observation that a significant fraction of respondents avoid choosing low-benefit, low-price A in {A,B,C} but seem to prefer it in {A,C} has been used to support this premise (e.g., Simonson and Tversky, 1992; Prelec et al., 1995). Because compensatory strategies appear to be effortful, researchers have speculated they are used in easier tasks like binary product-choice while less effortful non-compensatory heuristics are used in more difficult tasks like trinary product-choice (Payne et al., 1992).

Examples of factors thought to decrease choice difficulty are dominance relationships (e.g., Ariely and Wallsten, 1995; Dhar, 1996a; Huber et al., 1982; Montgomery, 1987, 1989; Simonson, 1989; Tyebjee, 1979; Wedell, 1991), high preference strength (e.g., Mishra, Umesh and Stem, 1993) and product class knowledge. On the other hand, choice difficulty is expected to increase when the products' degree of similarity increases because discriminability is expected to decrease as similarity increases (e.g., Tversky and Shafir, 1992a; Kreps, 1990).

Compatibility of decision strategy and response variables. Theorists suggest consumers use decision strategies that are compatible with the responses required of them (e.g., Shafir, 1993; Tversky, Sattath, and Slovic, 1988). For example, Tversky et al. posit that choice tasks evoke processes based on the ordering of attribute magnitudes because choice requires an ordinal response. As a result, these authors speculate choice tasks heighten consumers' tendencies to select the option that is ordinally superior on the most important attribute, especially when the choice task is difficult (also see Slovic, Griffin and Tversky, 1990).

According to Shafir (1983), the compatibility principle indicates that respondents' focus on positive attributes should be greater when they are asked to choose, rather than reject, an option from a set of alternatives. Attractive attributes are compatible with preference formation (e.g., quality), and negative attributes are compatible with rejection (e.g., price). In a similar vein, Pratkanis and Farquhar (1992) report that knowledge of the existence of a competitor that is currently unavailable (e.g., due to an out-of-stock situation) leads to an over weighting of the attribute in which the unavailable competitor excels relative to the current target option. By the compatibility principle, the current option may be seen as ordinally inferior to the unavailable competitor thereby affecting the buyers' reservation threshold.

Loss aversion: relating options' relative advantages and disadvantages to choice. Tversky and Kahneman (1991) extended the principle of loss aversion to riskless choice by interpreting the value function in terms of the psychophysics of hedonic experience. They conjectured that because pain is experienced more acutely than pleasure, consumers seeking to maximize utility assign greater weight to the negative rather than to the positive consequences of their choices. In addition, they posited the marginal effect of gains and losses decreases as their magnitude increases due to the principle of diminishing marginal sensitivity. According to Tversky and Kahneman, (a) gains are increases in positive attributes (e.g., increases in quality) or decreases in negative attributes (e.g., decreases in price); (b) losses are decreases in positive attributes (e.g., decreases in quality) or increases in negative attributes (e.g., increases in price); and (c) losses (gains) in negative attributes carry greater weight than losses (gains) in positive attributes : $\text{Losses}_{\text{Losses}} > \text{Losses}_{\text{Gains}} > \text{Gains}_{\text{Losses}} > \text{Gains}_{\text{Gains}}$.

Tversky and Kahneman also hypothesized gains and losses are generally defined relative to a neutral reference point such as the decision-maker's status quo or endowment level. Increases to one's endowment are gains, while decreases are losses. Giving up part of one's endowment should be more painful than an equivalent addition is pleasurable (e.g., Kahneman et al., 1988, 1990; Knetsch, 1989, 1992; Knetsch and Sinden, 1984; 1987; Thaler, 1980).

Process Explanations of Choice from Binary and Trinary Forced-Choice Sets

Context effects in trinary choice

Local contrast. Research by Simonson and Tversky (1992) and other theorists (e.g., Huber et al., 1982; Huber and Puto, 1983; Ratneshwar et al., 1987; Simonson, 1989; Tversky and Simonson, 1993) suggests variability in a trinary set's three incremental-value rates (refer to Equation 1.1 in Chapter 1) is a necessary condition to produce context effects such as attraction. Simonson and Tversky (1992) posit that in forced-choice set of form $\{A_{Lo},B_{Med},C_{Hi}\}$[3] there are three possible incremental-value rates, each representing a tradeoff. (a) Incremental rate ValueMed(Lo) represents the tradeoff between intermediate-benefit and low-benefit brands. (b) ValueHi(Lo) denotes the tradeoff between the high-benefit and low-benefit brands. (c) ValueHi(Med) represents the tradeoff between the high-benefit and intermediate-benefit brands. Simonson and Tversky conjectured consumers compared these three incremental-value rates to determine their preferred choice. They called this rate-comparison process local contrast.

For example, adding high-context D to core-pair [B,C] yields trinary choice set $\{B_{Lo},C_{Med},D_{Hi}\}$. When the high-context D option is similar and asymmetrically inferior[4] to C, its addition to the core pair increases C's absolute shares as well as C's relative-to-B shares. That is, $P(C_{Med}|B_{Lo},D_{Hi}) > P(C_{Hi},B_{Lo}\}$ and $\frac{P(C_{Hi}|B_{Lo})}{P(B_{Lo}|C_{Hi})} < \frac{P(C_{Med}|B_{Lo},D_{Hi})}{P(B_{Lo}|C_{Med}D_{Hi})}$, respectively. These changes to the absolute and relative preference for C across set contexts have been named the attraction effect (Huber et al., 1982). Similarly, adding low-context A to [B,C] yields $\{A_{Lo},B_{Med},C_{Hi}\}$. Adding an A brand that is a similar and asymmetrically inferior to B, increases B's absolute

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[3] Because of the importance of a product intra-set benefit position in context effects, each option in binary or trinary choice sets will appear subscripted to indicate its within-set relative benefit position. When choice sets are composed of non-dominated alternatives, the addition or removal of options may change the relative benefit and cost positions of the constant members of the set.

[4] For example, in $\{B_{Lo},C_{Med},D_{Hi}\}$, option D is asymmetrically inferior to C if $ValueD_{Hi}(B_{Lo}) > ValueD_{Hi}(C_{Med})$.

shares and its relative-to-C shares. In either case, the brand that is favored is the one most similar to the added alternative.

These results are in direct violations of three important assumptions underlying most choice models. (a) According to the constant ratio rule, the core-pair's relative share should remain constant across set contexts. (b) For regularity to hold, the absolute share of neither core-pair member should be higher in the trinary set than in the binary set. (c) According to the similarity effect, because it is in direct competition with the similar alternative, the added option should "steal" more shares from the similar alternative than from the dissimilar option.

Simonson and Tversky (1992) presented experimental evidence suggesting that an incremental-value structure of form [ValueMed(Lo) > ValueHi(Lo) > ValueHi(Med)] enhances the attractiveness of the intermediate option through local contrast. They also presented experimental evidence suggesting that an opposite incremental-value structural form detracts from the attractiveness of the intermediate option: [ValueMed(Lo) < ValueHi(Lo) < ValueHi(Med)].

According to Simonson and Tversky "... in the binary choice [context] there is only one tradeoff, and hence no room for [local] tradeoff contrast..." (1992, p. 288). Consequently, Tversky and Simonson (1993) did not introduce a local context component for choice sets having less than two product options in their componential context model.

Extremeness aversion. According to Simonson and Tversky (1992; also see Tversky and Simonson, 1993), context effects such as compromise and polarization can be explained through a process they termed "extremeness aversion" when a trinary set's three incremental values are constant. The extremeness aversion hypothesis states: (a) Options are evaluated in terms of relative advantages and disadvantages. (b) A disadvantage along a given attribute is at least as large as the corresponding advantage and matches its rate of growth. (c) Due to the principle of loss aversion, disadvantages loom larger than the respective advantages (Tversky and Kahneman, 1991). (d) The difference in the evaluation of advantages and disadvantages may be attribute

dependent (p. 291). (e) For two-dimensional options, extremeness aversion may be symmetric by pertaining to both attributes or it may be asymmetric by pertaining to only one of the two dimensions. However, Simonson and Tversky (1992) assert that there could not be extremeness aversion when consumers were considering two products because neither would be more extreme than the other (p. 292).

In the compromise effect, consumers show a marked preference for intermediate options from sets of form $\{A_{Lo}, B_{Med}, C_{Hi}\}$. In compromise-eliciting sets, the options are in a straight-line as indicated by the constant magnitude of their incremental-value rates: [ValueMed(Lo) = ValueHi(Lo) = ValueHi(Med)]. Supposedly, the constant incremental-value form precludes the effect of local contrast on choice.

Simonson and Tversky (1992) conclude consumers' preference for the intermediate alternative is due to symmetric extremeness aversion. The high-cost option has a large cost disadvantage while the low-benefit option has a large benefit disadvantage; the intermediate option has small cost and benefit disadvantages. As a result, the intermediate option appears more attractive than either extreme option due to consumers' loss aversion for both attributes.

In the polarization effect, consumers show a marked preference for extreme options in sets of form $\{A_{Lo}, B_{Med}, C_{Hi}\}$ with either constant--[ValueMed(Lo) = ValueHi(Lo) = ValueHi(Med)]--or "detraction-like" variable incremental-value rates--[ValueMed(Lo) < ValueHi(Lo) < ValueHi(Med)]. Simonson and Tversky (1992) conclude consumers' preference for the extreme alternative is due to asymmetric extremeness aversion—consumers are loss averse for quality but not for price.

Recall that both Prelec et al. (1996) and Simonson and Tversky (1992) found that consumers predominantly opted for the highest quality, most expensive option when choosing from trinary sets but chose the lower quality, less expensive option from binary sets. Simonson and Tversky explain this finding by speculating, along with others, that because quality or performance is the goal of a purchase while price is a means to achieve that goal, disadvantages

in quality would loom larger than disadvantages in price (p. 292; also see Hardie, Johnson, and Fader, 1993). As a result, when options are described in terms of quality (a positive attribute) and price (a negative attribute), the high-cost option's large price disadvantage is less important to consumers than the other options' benefit disadvantages (i.e., $\text{Gain}_{\text{Losses}} > \text{Loss}_{\text{Losses}}$) causing them to polarize toward the highest-quality C brand. Note that this hypothesis reverses a fundamental assumption of loss aversion: a loss in a negative attribute is more important than an equivalent loss in a positive attribute (i.e., $\text{Gain}_{\text{Losses}} < \text{Loss}_{\text{Losses}}$).

In addition, note that due to the surmised attribute-dependency of extremeness aversion, it should not be possible to demonstrate both polarization and compromise in replicate choice sets. However, Hollman and Lynch (1997) presented experimental evidence showing that both compromise and polarization effects could be produced by controlling for the sets' proportional rate of exchange configurations while using stimuli that would have been considered stimulus replicates by extant theory. This research and its implication for free-choice will be reviewed more in-depth in Chapter 3.

Subjective dominance relationships. Various theorists posit that decision-makers reconstruct the benefit-cost decision space in such a way that subjective dominance is achieved thereby facilitating choice (e.g., Ariely and Wallsten, 1995; Montgomery, 1987, 1989; Montgomery and Svenson, 1989). According to Ariely and Wallsten subjective dominance is a relationship constructed at the time of choice whereby differences in unimportant attributes are ignored while those of important attributes are weighted more heavily so that a clear subjective preference relationship emerges. Ariely and Wallsten's theory's central point is that changes in weights are highly dependent on the options' similarity relationships (p. 225). Increased option-similarity facilitates the construction of subjective dominance making the choice task easier. Note this conclusion is directly opposite to that of Tversky and Shafir (1992a) who surmised option similarity increased decision difficulty.

Ariely and Wallsten used their theory to explain the attraction effect. They interpreted their experimental results as suggesting that attribute importance depended on the task goal and, in conjunction with the options' constructed values, on intra-set attribute inter-relationships. In addition, they reasoned the results indicated that respondents used characteristics of the "irrelevant" options added to a constant core-pair to construct the options' value addresses as has been suggested by Prelec et al. (1995).

Context effects in binary choice. Figure 2-3 shows personal computer sets $\{A1_{Lo}, C1_{Hi}\}$, previously shown in Figure 2-2, and $\{A2_{Lo}, C2_{Hi}\}$ (from Hollman and Lynch, 1997). The ratio of the incremental benefit to the incremental cost of the $A1 \rightarrow C1$ interval (refer to Equation 1.3 in Chapter 1), ValueC1_{Hi}(A1_{Lo}) = .17 K/$, is represented by the slope of the dark solid line connecting A1 and C1. Also shown in Figure 2-3 are the absolute value of each option (e.g., ValueA1(0) = .50K/$) and each set's proportional rate of exchange (e.g., PRE(A1C1) = .3, refer to Equation 1.4 in Chapter 1).

In the componential context model (Tversky and Simonson, 1993) as in economic-based models, the importance-weights of common attributes are constant across products. However, according to Tversky and Simonson, consumers who have experience choosing from a product class compare the current incremental rate, ValueC_{Hi}(A_{Lo}), to a previously learned incremental-value rate in the same product class through a process they term background contrast. When the current incremental-value rate differs from the learned rate, the process of contrasting the two incremental-value rates changes the importance-weights of the products' common attributes.

The only other explicit assumption stated in the componential context model about the options' subjective values (see Equation 2.4) is that they conform to the assumptions of utility maximization in the absence of context effects. As a result, in the absence of tradeoff contrast the IIA property underlies the componential context model as well as random utility models. Thus, for inexperienced consumers, only the products' pairwise subjective-value difference (e.g., [SValueC-SValueA]) is important while the products' absolute-subjective values are immaterial

in terms of the choice probabilities (Ben-Akiva and Lerman, 1985). Since the common attributes' importance-weights are constant across products, the pairwise absolute-value difference, [ValueC(0)-ValueA(0)], serves as a proxy measure of the "true" pairwise subjective-value difference.

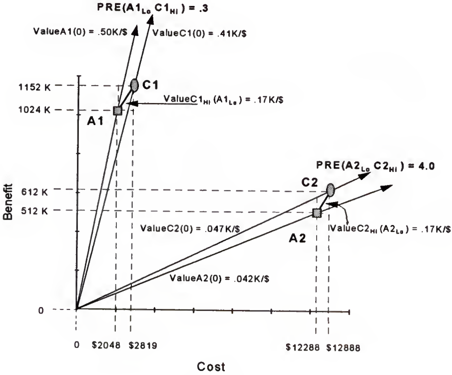

Figure 2-3. Sets with similar incremental ValueHi(Lo) can differ in the magnitude of their proportional rates of exchange: PRE($A2_{Lo}$,$C2_{Hi}$) = 4.0 v. PRE($A1_{Lo}$,$C1_{Hi}$) = .3. This difference is reflected in a significant difference for the C brand across sets: $P(C2_{Hi}|A2_{Lo}) = .71 > P(C1_{Hi}|A1_{Lo}) = .22$; $Z_{(Ho: P(C2|A2) > P(C1|A1))} = 2.22$, $p < .05$). Source: Hollman and Lynch, 1997.

Note that using the sets' incremental rates as criteria, set {$A2_{Lo}$,$C2_{Hi}$} is a stimulus replicate of set {$A1_{Lo}$,$C1_{Hi}$}, i.e., [ValueC1_{Hi}($A1_{Lo}$) = .17 K/$] = [ValueC$2_{Hi}$($A2_{Lo}$) = .17 K/$] (see Simonson and Tversky, 1992). Using the sets' proportional rates of exchange as a criteria, these two sets are not replicates, i.e., [PRE(A1C1) = .3] $\neq$ [PRE(A2C2) = 4.0].

Moving up $A2_{Lo} \rightarrow C2_{Hi}$, $PRE(A2_{Lo}C2_{Hi}) = 4.0$ indicates the proportional increase in benefits is 4 times the proportional increase in cost, heightening C2's relative attractiveness $[P(C2_{Hi}|A2_{Lo}) = .71]$. In contrast, moving up $A1_{Lo} \rightarrow C1_{Hi}$, $PRE(A1_{Lo}C1_{Hi}) = .3$ indicates the proportional increase in benefits is 3-tenths the proportional increase in cost, decreasing significantly C1's relative attractiveness $(P(C1_{Hi}|A1_{Lo}) = .22)$. Thus, it is not surprising that C2 is more popular in its choice context that C1 is in its context ($Z_{(Ho: P(C2|A2) > P(C1|A1))} = 2.22$, $p < .05$).

In summary, in the absence of background contrast, there is no distinction between the componential context model and the economic-based discrete choice models. The important point is, however, that Tversky and Simonson's model implies decision-makers use products' absolute values as well as pairwise incremental values during of preference formation and choice.

Currently Proposed Determinants of Product-Choice in Free-Choice

Inclusion of Non-Price Costs into the Value Function

For consumers who are free to defer product-choice, selecting a product-option is normative only when at least one of two conditions hold. (a) The consumer's self-defined preferred product is a member of the set. Or, (b) the cost of deferring choice outweighs the gains expected from continuing the search for a more preferred alternative (Karni and Schwartz, 1977). The potential benefits of continued search include finding a better alternative and the acquisition of information that may be used to update the reservation threshold (e.g., Goering, 1986; Karni and Schwartz, 1977; Kohn and Shavell, 1974; Rothschild, 1974; Fishman, 1996).

Treating the decision to defer choice as just another option allows the inclusion of non-price costs into the utility function, e.g., search costs (e.g., Karni and Schwartz, 1977; Lippman and McCall, 1976; Rothschild, 1974; Shapiro, 1983; Stigler, 1961; Telser, 1973). Beside possible monetary costs, the cost of search also includes processing effort, opportunity cost, and regret. When the cost of search is above the reservation price, search ceases to be a viable option even when prices are high (Fishman, 1996).

Hypothesized relationship of loss aversion, transaction perspective, and status quo bias

Status quo bias. Previous research has been interpreted as suggesting that sellers and buyers are loss averse--transaction "losses" will invariably matter more to people than transaction "gains" leading to a strong bias for the status quo (e.g., Kahneman, 1992; Kahneman et al., 1990; Knetsch, 1992; Knetsch and Sinden, 1984, 1987; Samuelson and Zeckhauser, 1988; Tversky and Kahneman, 1991). Specifically, buyers' product-acquisitions, being inflows to their endowments, should be seen as gains by the buyers. On the other hand, sellers' product-sales, being outflows to their endowments, should be seen as losses by the sellers. Similarly, buyers' expenses, being outflows to their endowments, should be seen as losses by the buyers. Whereas the sellers' revenues, being inflows to their endowments, should be seen as gains by the sellers.

Also by loss aversion, increases in losses carry more weight than corresponding decreases in gains (Tversky and Kahneman, 1991). As a result, the sellers' loss due to their disposal of product-assets and the buyers' loss of money-assets due to their buying activities should carry a greater weight than their transactions' corresponding gains: the sellers' acquisition of money-assets and the buyers' acquisition of product-assets. By this logic the modal behavior for buyers and sellers should be status quo maintenance and a refraining from participating in trading activities (see Samuelson and Zeckhauser, 1988). The implication of the previous argument is that similar majorities of potential sellers (current product-owners) and potential buyers (current money-owners) should opt to maintain their status quo (Knetsch and Sinden, 1987). That is: $P(\text{keep A}|\text{sell at }\$x) \approx P(\text{keep }\$x|\text{buy A}) > .5$.

This expectation is contrary to standard assumptions of economic theory (Kahneman et al., 1990). According to the Coase Theorem, resources will be allocated efficiently in the absence of transaction costs and income effects irrespective of the initial assignment of property rights (Coase, 1960; also see Barzel and Kochin, 1992; De Serpa, 1992; Norton, 1987). That is, goods end up in the hands of those who most value them when trading transactions are costless (Kahneman et al, 1990). For example, suppose that through random assignment each half of a

group of "economic agents" (respondents) are assigned to be "owners" or "nonowners." Each owner is endowed with a consumption good, A, and is free to keep or sell A, thus becoming a potential seller. Nonowners are potential buyers who are free to acquire A from owners willing to sell. Both sellers and buyers are price takers. Under these conditions, the simple prediction is that one-half of the goods should be bought (sold): P(sell at \$x*| keep A) ≈ P(buy A| keep \$x*) ≈ .5 = DS* (Kahneman et al., 1990). The price at which this equality hold is termed the market clearing price and is designated as \$x*. This prediction also implies its reverse. At \$x*, one-half of the potential buyers or sellers should maintain their status quo by deferring to buy or sell A: P(keep A|sell at \$x*) ≈ P(keep \$x*| buy A) ≈ .5 = SQ*.

Figure 2-4 shows a schematic illustration of these predictions. The levels of A supplied and demanded (DS* = .5 read from the left-hand *Y-axis*) coincide at price \$x*, where half of the buyers and sellers perceive product A's utility to be matched by its price. Note that while A provides consumer surplus to buyers at prices lower than \$x*, it provides a "seller deficit" to owners at those same prices. As a result, the proportion of product-owners opting for the status quo (read from the right-hand *Y-axis*) by deferring to sell (1-supply), should be greater than the proportion of buyers maintaining their status quo by deferring to buy (1-demand), for a given price \$x < \$x*. At prices higher than \$x*, A provides a consumer deficit to buyers but it provides sellers with a "seller surplus." Hence, the proportion of product-owners maintaining their status quo should be less than the proportion of buyers opting for the status quo for any \$x > \$x*.

Transaction perspective. The economic assumptions underlying Figure 2-4 specify no effect of transaction perspective when benefit and price levels are controlled. Buyers and sellers agree as to A's utility level. Thus, the proportion of A's owners willing to sell will not equal the proportion of willing buyers unless there are equal segments in either group for whom A's price matches its utility, i.e., when ValueA(0) = 1.

An important implication is that the proportion buying (selling) A will be similar to the proportion deferring to sell (deferring to buy) A whenever buyers and sellers agree in their

valuation of product A. For example, when most buyers and sellers agree that A is "overpriced," a majority of owners wants to sell while a majority of buyers refuses to buy: P(buy A|keep $\$x_A$) ≈ P(keepA|sell A at $\$x_A$) < .5. When most buyers and sellers agree that A is "underpriced," a majority of owners refuses to sell while a majority of buyers is eager to buy: P(buy A|keep $\$x_A$) ≈ P(keepA|sell A at $\$x_A$) > .5. Note that the same buyer-seller behavior is predicted by standard economic theory and endowment effect for both overpriced-A and underpriced-A conditions.

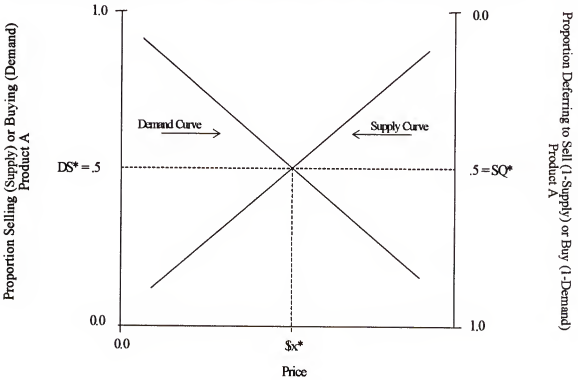

Figure 2-4. Schematic diagram showing the expected proportion of buyers or sellers who (a) buy (demand curve) or sell (supply curve) product A at price \$x (read from the left-hand *Y-axis*) and (b) maintain their status quo by deferring to buy (1-demand) or to sell (1-supply) A at \$x (read from the right-hand *Y-axis*). According to standard economic theory, with random assignment of right of ownership of good A and in the absence of income effects and transaction costs, half (DS* = .5) of the buyers (sellers) should agree to buy (sell) A at the market clearing price \$x*.

Kahneman et al. (1990), along with other behavioral researchers, have already reported that, given random assignment of property rights and market-price knowledge, neither buyer-

seller choice pattern predicted by the status quo bias nor the Coase theorem holds. These authors' results showed (a) that at a set price, sellers were more reluctant to sell than buyers were willing to buy, and (b) that the volume of trade was significantly less than .5. The observed pattern was:

2.5 $\quad P(\text{keepA}|\text{sell at }\$x) > P(\text{keep}\$x|\text{buyA}) > .5.$

The sellers' status quo bias appeared to be greater than the buyers' status quo bias. Because the incorporation of acquired products into buyers' endowments was interpreted by researchers as increasing the products' utility for their new owners, this phenomenon was named the endowment effect (Thaler, 1980).

Process explanation of the endowment effect. Kahneman et al. (1990) advance a process explanation for the endowment effect using loss aversion (Kahneman and Tversky, 1979, 1983) as its central argument (also see Knetsch, 1992; Knetsch and Sinden, 1984, 1987). They assert the endowment effect occurs due to an asymmetric valuation of product-benefits by buyers and sellers (also see Knetsch, 1992; Knetsch and Sinden, 1984, 1987). By loss aversion, sellers overvalue A's product-benefits because they perceive the disposal of the product-benefits as a loss. Buyers undervalue A's benefits because its acquisition represents a gain.

That is, owners of A see the selling transaction as decreasing their endowment, E, from E+A to E. In contrast, buyers of A see the buying transaction as increasing their endowment from E to E+A. Because a decrease to one's endowment represents a loss while an equivalent increase represents a gain, A's product-benefits must appear greater to A's owners than to A's buyers:

2.6 $$\frac{SBenefitA(0)_{Seller}}{SBenefitA(0)_{Buyer}} > 1.$$

By a similar argument, however, foregoing part of their money endowment, $\$x_A$, to acquire A should have represented a loss to the buyers—their endowment would decrease from \$E to \$E-$\$x_A$. While for sellers, the revenue from the selling transaction, $\$x_A$, should have represented an equivalent gain—their endowment would have increased from \$E to \$E+$\$x_A$. As a result, A's price must appear greater to A's buyers than to A's sellers:

2.7 $$\frac{SPriceA(0)_{Seller}}{SPriceA(0)_{Buyer}} < 1.$$

Equations 2.6 and 2.7 show that a strict application of loss aversion to the buyers' and sellers' losses and gains could not yield the observed asymmetry in the buyers' and sellers' behaviors shown in Equation 2.5. The observed behavior described by the latter equation appears to indicate that sellers are more averse to their "endowment losses" than the buyers are to theirs.

Kahneman et al. (footnote 3, 1990) conjectured loss aversion seems to affect owners only when goods are bought as working assets rather than for subsequent resale, and to affect buyers only when the prices of goods seem unusually high. To explain the valuation asymmetry shown by sellers in giving up a consumption good versus buyers in giving up money, Tversky and Kahneman (1991) state the buyers' behavior "...[is] consistent with the standard theory of consumer choice, in which the decision of whether or not to purchase a good is treated as a choice between it and other goods that could be purchased instead..." (p 1055). But, if buyers are able to view money solely as a representative for coveted goods, what prevented sellers from similarly treating foregone revenue as a loss of purchasing power?

Moreover, recall that in the standard theory of choice the utility of money is variable: as the price of a good increases the utility of money rises making costlier products increasingly more aversive. By this logic, "buyers" offered choice sets {A2,C2}, depicted in Figure 2-3, should have found C2 even more aversive than buyers who were offered {A1,C1} since both sets' incremental values were similar and C2's price was much higher than C1. Instead, buyers found the more expensive C2 attractive [P(C2|A2) = .71] and the less expensive C1 aversive [P(C1|A1) = .22].

To test the hypothesized asymmetric valuation of product-benefits by buyers and sellers, Kahneman et al. (1990) gave Cornell coffee mugs to students on alternating seats in a classroom, telling all participants to examine their neighbor's or their own mug. These mugs were familiar to the students because they were readily available in their bookstore for $6 each. The "endowed" owners could sell or keep the mugs while the other participants were free to buy the mugs.

As predicted by status quo bias the number of trade transactions was much lower than .50. In addition, Kahneman et al. also found that (a) sellers were more reluctant to sell than

buyers were unwilling to buy and (b) the median seller wanted at least $5.25 for the mug while the median buyer wanted to pay at most $2.25-$2.75. Kahneman et al. concluded that sellers overvalued the mug because they saw the selling transaction as a loss--their endowment would decrease from E+mug to E. Meanwhile buyers undervalued the mug because they saw the buying transaction as a gain--their endowment would increase from E to E+mug. By a similar argument, however, foregoing of part of their money endowment should have represented a loss to the buyers--their funds would decrease from $E to $E-$mug--and a corresponding gain to the sellers--their funds would increase from $E to $E+$mug.

Let us now examine the mug experiment from a benefit-cost perspective. Per the authors, respondents were well acquainted with the mug and its $6 price due to its availability in the campus' bookstore. Thus, it is plausible that the "sellers" and "buyers" agreed on the mug's objective value:

2.8 ValueMug(0) = Benefit(1mug)/$6.

As shown in Figure 2-5, let us assume the mugs' subjective value is given by:

2.9 SValueMug(0) = λValueMug(0) = λ[Benefit(1mug)/$6] = 1.

Thus, to the extent that respondents knew the mug's $6 actual price, Figure 2-5 illustrates that buyers may have been trying to obtain as high a consumer surplus as possible while sellers were trying to diminish their seller deficit as much as possible. Note that seeing the decision problem from this perspective indicates the buyers who actually bought valued the mug higher than the sellers who actually sold at that price. At the realized market price, buyers incurred an out-of-pocket expense of $4.50. In contrast, sellers could easily replace the mug with an out-of-pocket expense of only $1.50. If both buyers and sellers had valued the mug equally, the realized market price should have been $3.00 since at that price buyers' and sellers' out-of-pocket expenses would have been equal.

The above analysis implies buyers and sellers use the same decision process but view the decision problem from opposite perspectives. Such a premise cannot be tested using the

traditional demonstration of endowment effects represented by the mug experiment reviewed above. To determine whether loss aversion or relative value give the better explication of buyer and seller behavior requires the separate testing of the two effects predicted by loss aversion: status quo bias, and transaction-dependent valuation strategies--product-benefit overvaluation by sellers and undervaluation by buyers.

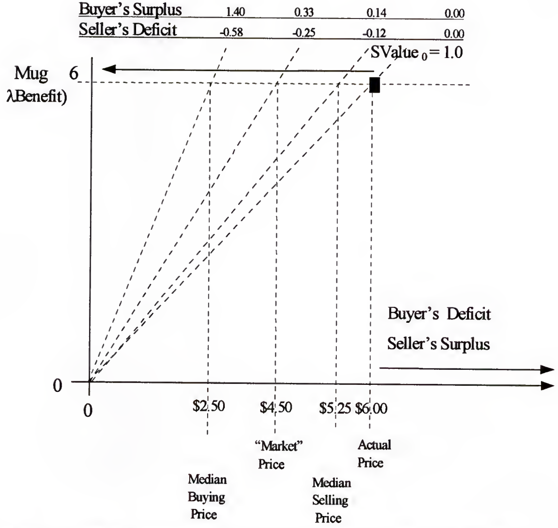

Figure 2-5. Schematic representation of buyers' surplus and sellers' deficit for the mug experiment by Kahneman et al (1990).

For example, buyers' and sellers' degree of loss-aversion-dependent status quo bias should not vary when the decision context is expanded, e.g., {defer, A_{Buy}} to {defer, A_{Buy}, C_{Buy}} or {defer, A_{Sell}} to {defer, A_{Sell}, C_{Sell}}. Moreover, if a majority of buyers found A or C equally aversive when choosing from {defer, A_{Buy}} or {defer, C_{Buy}}, the relative preference for A versus C should not change when the decision context is expanded to {defer, A_{Buy}, C_{Buy}} or when it is changed to a forced-choice context as in {A_{Buy}, C_{Buy}}. On the other hand, assume an equal majority of sellers sold A or C from {defer, A_{Sell}} or {defer, C_{Sell}}, BenefitA < BenefitC, and sellers overvalued product-benefits. Sellers should prefer to dispose of A and keep C whether the context is free-choice, {defer, A_{Sell}, C_{Sell}}, or forced-choice, {A_{Sell}, C_{Sell}}. The various tests of transaction-dependent valuation strategies and status quo bias will be reported in Chapters 4, 5, and 6.

Conflict and option similarity

The economic perspective assumes product choice is independent of irrelevant alternatives. Suppose that similar proportions of buyers buy A from {defer,A} or C from {defer,C}, where A and C offer different levels of the same product attributes. Under this condition, the addition of C to {defer,A} should not significantly affect the valuation of A or C. As a result, the proportion opting to defer product-choice from the expanded set {defer,A,C} should not differ significantly from the combined expected defer-decision incidence from {defer,A} and {defer,C}, i.e., $P(\text{defer}|A,C) \approx 1-P(J_{BuyA,C}|\text{defer})$ (see Equation 1.1). Note that this prediction is the same as the one stated above given the assumption of loss-aversion-dependent status quo bias In this section, I review behavioral researchers' tests of this prediction for buying transactions.

Effect of choice set composition on task difficulty and conflict. Because consumers are supposed to use compensatory decision strategies when evaluating a pair of non-dominated products, Tversky and Shafir (1992a) hypothesized deciding whether to obtain A or C from

{defer,A_{Med},C_{Hi}}[5] would require greater resources than deciding whether or not to obtain A from {defer,A_{Hi}}. In addition, they varied the degree of decision difficulty in the trinary sets by including pairs in which one option dominated the other (Easy condition) and pairs of non-dominated options that were similarly liked (Conflict condition). Within the Conflict condition, the pairs of similar options varied across sets by the quality of the options (higher vs. lower). They expected deferral to be highest from the Conflict condition trinary sets because respondents would find it easier to defer than to engage in the effortful tradeoff strategy.

Their empirical results supported their premise. The proportion of respondents choosing to defer increased significantly when they were choosing from Conflict trinary sets than either from Dominance trinary sets or binary sets, whether they were gambles, rental apartments, or CD players. Tversky and Shafir concluded the degree of effort associated with product-choice depended on the relationship of the products' attributes [i.e., ValueC(A)], not simply on their absolute values [i.e., ValueC(0)-ValueA(0)]. However, Tversky and Shafir also reported that in accord with value maximization, the proportion opting to defer was significantly greater when the product-option pairs in the Conflict condition were less attractive than when they were more attractive, P(defer|2lower) > P(defer|2higher), $p < .01$ (p. 360). Thus, the global results were P(defer|2lower) > P(defer|2higher) > P(defer|1lower,1higher).

Effect of option similarity on value uncertainty. Dhar (1996a) disagrees with the Tversky and Shafir's difficulty explanation for the increased preference for the deferral option in the Conflict trinary sets. Instead, Dhar attributes such regularity violations to consumers' uncertainty about their own values. To support his position, Dhar reports a study (Study 1) using four product classes: speakers, answering machine, laptop computer, and electric shaver. He tested for changes in P(defer|product) depending on (a) the number of attractive products in the set (Size: binary sets

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5 Although A is the product with the lower benefit position in the set, as its subscript indicates, its benefit position is intermediate between the defer option at position (0,0) and the C product position.

of form {defer, X}; or trinary sets of form {defer,X,X'}),[6] (b) the number of tradeoffs (Tradeoffs: two or four), and (c) the degree of similarity in degree of attractiveness (PairSimilarity: both similarly attractive--X and X'; one more attractive than the other--X and Y).

There were no significant differences in the pattern of choice across the four product classes. A significant minority of respondents opted to defer when choosing from either binary sets (P(defer|1 product) = .41, $Z_{(H0: P(defer|product) < .5)} = 2.45$, $p < .01$) or trinary sets (P(defer|2 products) = .44, $Z_{(H0: P(defer|product) < .5)} = 2.45$, $p < .01$), confirming the attractiveness of the products. These two proportions were not significantly different, $\chi^2_{(1)} = .475$, $p > .49$. These results imply the choice pattern could be explained by appealing to the similarity effect.

The main effect of PairSimilarity was significant, $\chi^2_{(1)} = 31.51$, $p < .0001$. When the two products were similarly attractive, the proportion deferring choice was P(defer|X,X') = .52--this proportion did not differ significantly from the proportion opting to defer (.54) in Tversky and Shafir's Conflict(higher quality pair) condition. But, when one of the two products was relatively less liked than the other one, a significant minority opted to defer (P(defer|X,Y) = .27, $Z_{(H0: P(defer|X,Y) < .5)} =$ $p < .01$). Thus, the global results mirror those of Tversky and Shafir: P(defer|2higher) > P(defer|1lower,1higher). However, the main effect of Tradeoffs was not significant ($\chi^2_{(1)} = .118$, $p > .73$), casting doubt on the difficulty explanation advanced by Tversky and Shafir (1992a). Whether the number of tradeoffs required were 2 or 4, P(defer|X,X') = .52 was not significantly different from .50. Lending further support to Dhar's value-uncertainty explanation, this proportion did not differ from the aggregate proportion of respondents opting to defer (.52) in Tversky and Shafir's Conflict v. Easy experiment.

Unfortunately, because the main effect of set size on P(defer|product) was not significant for this study (nor for his study 5), Dhar's overall results could also be explained via a

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6 Dhar did not provide specific information on the products attribute magnitudes. Therefore, X, X', and Y are used as symbols only to represent product similarity levels as reported by Dhar and should not be interpreted as implying relative benefit positions.

hierarchical decision model incorporating both competition due to the similarity effect and consistent taste heterogeneous segments. The following counterexample demonstrates this.

Table 2-1 shows simulated choice data by a heterogeneous population consisting of three segments (I: 65%; II: 5%; III: 30%) that are internally homogeneous and entirely consistent in their choice decisions for an equal number of purchase occasions with variable availability of brands in product class H (A: low quality; B: intermediate quality; C: high quality). Segment I is indifferent among brands of H ($A \approx B \approx C$). Segment II tends to be cost conscious and will not consider H brands higher than intermediate in quality ($A \geq B$). Segment III is interested in obtaining high-quality H brands only (C). During each purchase occasion, members of each segment buy either one brand from H or from some other product class.

The left most column of Table 2-1 shows each segment's purchasing members and their constant preferences. Each segment's choice probabilities for available alternatives are shown below each available H brand and Non-H product class. Unavailable H brands are denoted N/A. During the first three buying occasions only one brand of H was available for purchase, yielding restricted binary sets {non-H,A}, {non-H,B}, or {non-H,C}. During the next two buying occasions, two brands of H were available for choice, yielding restricted trinary sets {non-H, A,B} or {non-H,A,C}. In the last choice occasion, A, B, and C were available.

The population's estimated choice probabilities are denoted as Market Share. For example, when only A was available, .64 of the population bought within product class H. This proportion increased to .85 when C was the only available H brand. The estimated product-decision incidence for buying within H (see Equation 1.1 in Chapter 1) or outside of product class H is denoted as Product Class Level Share. For example, using the binary data, the estimated probability of buying from H when A, B, or C is available is $P(J_{BuyH}|\text{non-H}) = .71$. Using the restricted trinary data--i.e., when two of the three brands are available--yields a similar estimate of Product Class Level Share, $P(J_{BuyH}|\text{non-H}) = .76$.

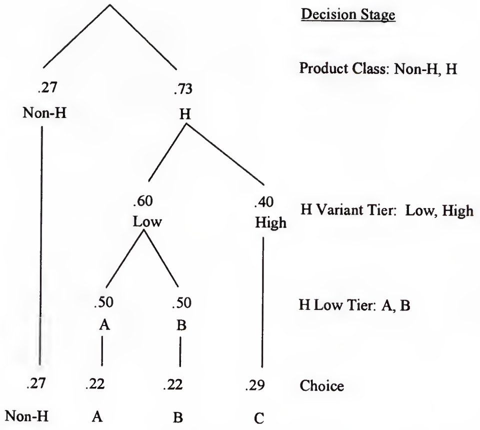

Figure 2-6. Hierarchical decision model of simulated choice data shown in Table 2-1.

Note that using either the restricted binary or trinary data, the estimated choice probabilities suggest a hierarchical decision-making process that conforms to the choice pattern revealed when the complete choice set is available (shown at the bottom of Table 2-1). The recovery of the hierarchical model depicted in Figure 2-6 indicates that the IIA property holds within each of the model's levels (see McFadden, Tye, and Train, 1977; Ben-Akiva and Lerman, 1985).

The key insight is that the probability of choosing from product class H may differ across segments when taste heterogeneous segments, that are internally consistent, choose from choice sets that vary across choice occasions. Using the product-class-level share estimated from the

restricted binary data as a base to test the effect of adding a second H-brand on the buying incidence of [without-H] may foster erroneous conclusions unless the same brands are represented in both the base proportion and the test proportion.

For example, comparing [1-P(J_{BuyH}|non-H)] to the proportion choosing to buy outside-H from {non-H,A,B} or from {non-H,A,C} would suggest to the analyst that choosing from two similarly liked H-brands versus two differentially liked H-brands causes a change in consumers' choice strategies.[7] The spurious context effect disappears when choice data from a restricted trinary set is tested against control data that incorporate the same choice option, e.g., {non-H,A,B} versus [{non-H,A} & {non-H,B}].

Summary

This review has shown there are unresolved conflicting explanations of choice behavior in free-choice contexts across decision researchers with economic or behavioral perspectives, as well as among behavioral researchers themselves. Ever since Lancaster's (1966) cogent article on the subject, the preeminent importance of attributes over products per se as the suppliers of utility has been well accepted by choice researchers with predominantly economic or behavioral perspectives. With the exception of the similarity effect (Tversky, 1972), behavioral researchers' entreaties about the importance of the interrelationship of decision processes and decision contexts to consumers' perceptions of product utility and, thereby, to their observed product-choice inconsistencies have not been as widely embraced. The main reason the similarity effect has been accepted is that it demonstrated systematic violations of the central assumption of standard choice theory that cannot be otherwise explained away and that do not cancel out at the aggregate level.

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[7] [1-P(J_{BuyH}|non-H)] - P(non-H|A,B) = -.36 versus [1-P(J_{BuyH}|non-H)] - P(non-H|A,B) = .18.

Table 2-1. Data for a heterogeneous population without the IIA property at the aggregate level with homogeneous segments.

Segment Preference		Buy Within Product Class H		
Choice Sets / Restricted Binary:	Buy Outside Product Class H	A	B:N/A	C:N/A
I (n = 65) A≈B≈C	.08	.92		
II. (n = 5) A≥B	.17	.83		
III. (n = 30) C	1.00	.00		
Market Share	.36	.64		
Restricted Binary:	Outside H	A:N/A	B	C:N/A
I (n = 65) A≈B≈C	.08		.92	
II. (n = 5) A≥B	.17		.83	
III. (n = 30) C	1.00		.00	
Market Share	.36		.64	
Restricted Binary:	Outside H	A:N/A	B:N/A	C
I (n = 65) A≈B≈C	.08			.92
II. (n = 5) A≥B	1.00			.00
III. (n = 30) C	.17			.83
Market Share	.15			.85
Estimated with Binary Data				
Market Share	.29	.21	.21	.28
	Non-H	H		
Product Class Level Share	.29	.71		
Restricted Trinary:	Product Class H	A	B	C: N/A
I (n = 65) A≈B≈C	.08	.46	.46	
II. (n = 5) A≥B	.17	.50	.33	
III. (n = 30) C	1.00	.00	.00	
Market Share	.36	.29	.29	
Restricted Trinary:	Outside H	A	B:N/A	C
I (n = 65) A≈B≈C	.08	.46		.46
II. (n = 5) A≥B	.17	.83		.00
III. (n = 30) C	.17	.00		.83
Market Share	.11	.34		.55
Estimated with Trinary Data				
Market Share	.24	.22	.22	.32
	Non-H	H		
Product Class Level Share	.24	.76		
Estimated with Restricted Data				
Market Share	.27	.22	.22	.29
	Non-H	H		
Product Class Level Share	.27	.73		
Complete Choice Set:	Outside H	A	B	C
I (n = 65) A≈B≈C	.08	.30	.31	.31
II. (n = 5) A≥B	.17	.42	.41	.00
III. (n = 30) C	.17	.00	.00	.83
Market Share	.11	.22	.22	.45
	Non-H	H		
Product Class Level Share	.11	.89		

As long as the aggregate data are consistent with the following assumptions, they are consistent with the standard product-preference-based choice theory. (a) From every product choice set, at least one acceptable product is chosen (the non-emptiness condition). (b) Given that A, B, and C, are comparable, are members of global product set S, and each is chosen from subsets of S, then A, B, and C are members of the set of acceptable products. No member of this set is strictly preferred to another, i.e., $A \geq B \geq C$. And (c), if any two acceptable products (e.g., A and C) are both members of subsets S1 and S2, and if A is chosen from S1 and C is chosen from S2, then A is also a member of the set of acceptable products from S2, and C is also a member of the set of acceptable products from S1 (see Kreps, 1990).

The use of what are thought to be inherently attractive products in demonstrations of context effects is pervasive in the literature. For options A, C, and C', when $P(A|defer) \geq .5$, $P(C'|defer) \geq .5$, and $P(C'|defer) \geq .5$, then A, C', and C are members of the set of acceptable products. A major problem with this approach is that there is no set of finite choice data involving options that are acceptable products that could be used to challenge the assumptions above. Thus, demonstration of context effects on choice using all attractive products across samples can be explained away by appealing to taste heterogeneity and building counterexamples such as the one depicted in Table 2-1 and Figure 2-6. These counterexample can be made highly elaborate by applying different choice mechanisms to each level of the hierarchy (Ben-Akiva and Lerman, 1985).

On the other hand, assume we start out with products A, C, or C', from the same product class, described with different levels of the same attributes with none of the options dominating any other one. By this description, the three brands should be in direct competition for at least a portion of the population and the similarity effect should be operational. Each is paired with "defer," in {defer,A}, {defer,C}, or {defer,C'}. But now, the choice data from each free-choice set reveals the product to be strictly worse than having nothing for a preponderance of consumers

such that: $[P(A|defer) + P(C|defer) + P(C'|defer)] < .5$, $P(J_{BuyA,C,C'}) < .2$, and $[P(A|defer) \approx P(C|defer) \approx P(C'|defer)]$.

The above scenario indicates the non-emptiness condition is violated for a significant majority. In addition, by the taste heterogeneity interpretation of the similarity effect, $P(A,C|defer) \leq P(J_{BuyA,C}) \leq [P(A|defer) + P(C|defer)]$. The same could be said for {defer,A,C'}. We would arrive at the same conclusion by the endowment effect, status quo bias, loss aversion, etc. With one exception, under none of the hypotheses of the determinants of choice reviewed here could the addition of A to {defer,C} or to {defer,C'} be expected to increase the proportion choosing one of the products significantly above .5 in either {defer,A,C} or {defer,A,C'}. The lone exception is relative value theory.

Decision researchers have postulated that option preference (a) is constructed at the time of choice and (b) is highly dependent (i) on the interrelationship of the choice options' attributes (e.g., Huber, Payne, and Puto, 1982; Simonson and Tversky, 1992; Tversky and Kahneman, 1991; Ariely and Wallsten, 1995), (ii) on decision makers' goals and objectives, and (iii) on human pervasive perceptual processes such as diminishing marginal sensitivity (Kahneman and Tversky, 1983; Tversky and Kahneman, 1991). Relative value theory is in agreement with these statements.

Other decision researchers with an economic perspective assume consumers (a) incorporate non-price costs to determine choice options' values, (e.g., Karni and Schwartz, 1977) and (b) tend to have stable reservation thresholds that are updated when relevant information warrants it (e.g., Goering, 1986; Karni and Schwartz, 1977; Kohn and Shavell, 1974; Wernerfelt, 1995). Relative value theory is also in accord with these statements.

Relative value theory departs from extant theory in several ways. Products represent specific combinations of benefits and costs that are meaningfully interrelated to other products with similar combinations of benefits and costs. Choice processes are assumed to be stable across contexts. However, the inputs to the decision process, or the decision goal that defines the domain

of the choice task, may change from choice occasion to choice occasion thereby affecting the output of the decision process, i.e., the choice response. Product choice is seen as the end result of a decision process whose inputs are attribute magnitudes, relations among attributes, and relations among those relations as interpreted through the filter of the goal of the decision task (also see Biederman, 1987; Gentner, 1983; Gentner and Clement, 1988; Gentner and Landers, 1985; Medin, Goldstone, and Gentner, 1990; Norman and Rumelhardt, 1975; Palmer, 1975). Thus, rather than being a reflection of a product-based preference structure, product choice is a manifestation of a relation-based preference structure.

In the following chapter, I review the basic concepts of relative value theory and provide a more in-depth view of those concepts that are of particular importance to the goals of the dissertation.

CHAPTER 3
REVIEW OF RELATIVE VALUE THEORY

Discrete Decision Context

Goal orientation

Attribute relevancy

Because behavior is goal oriented, the goal of a decision event forms an evaluative framework that determines the relevancy and valence of the decision elements. Attributes deemed irrelevant to goal achievement are ignored while those that are relevant are noticed.

Attribute valence

Relevant attributes are of two types. Any relevant attribute that is conducive to the attainment of a specific goal or that increases reserves is an attractive attribute that decision-makers attempt to maximize. Such attractive attributes are termed benefits. Any relevant attribute that appears to be detrimental to the attainment of a specific goal or to diminish reserves is an aversive attribute that decision-makers attempt to minimize. Such aversive attributes are termed costs.

Product-attribute prominence

Product-attribute prominence is dictated by decision makers' primary goals (see Grossberg and Gutowski, 1987; Tversky et al., 1988; Simonson and Tversky, 1992). Product benefits are intrinsic product attributes that are perceived as valuable to the accomplishment of an intended goal. Consumers come to the marketplace seeking product-benefits rather than the products per se (Lancaster, 1967). Hence, product-benefits motivate acquisition transactions (Hollman and Lynch, 1997).

Consequently, product-benefits tend to be more prominent than product costs within a buying or acquiring context (see Hardie et al., 1993; Kahneman and Tversky, 1991; Kahneman et al., 1990; Shafir, 1993; Simonson and Tversky, 1992; Tversky and Simonson, 1993). Product costs reflect something consumers may be willing to incur in order to satisfy the goal that motivated entering an acquisition transaction (Hollman and Lynch, 1997; Simonson and Tversky, 1992). Thus, product-preference is highly dependent on the type and magnitude of the attributes associated with the products under consideration.

Evaluation and Choice Sets

Decision event

A decision event encompasses a discrete decision context as depicted in Figure 3-1. The decision context comprises the decision maker's external and internal choice environments. Any data that are accessible and relevant during a decision event becomes part of the decision-context information used for solving a decision problem. Relevant data may be accessed either from the external environment or from memory.

Choice sets versus evaluation sets

As is typical, the set comprising all options that are available and relevant to the decision-maker will be referred to as the choice set. A generic choice set is represented symbolically as {S}. The evaluation set is comprised of all elements taken into account by a decision-maker for the purpose of estimating the relative value of the choice options. As a result, the evaluation set may be different from the choice set. A generic evaluation set is represented symbolically as {E}.

For example, Figure 3-1 shows a decision event wherein decision-makers use relevant information about B--accessed from the external environment--and C--accessed from memory--to evaluate whether to acquire A. As a result, the evaluation set, E{defer,A,B,C}, includes information on more products than the effective choice set S{defer,A}.

Forced-choice format versus free-choice format

Both S{defer,A} and S{A,C} are considered binary sets--respondents offered either set must choose one of two responses or benefit positions. However, all else equal, their evaluation sets differ in size. In free-choice S{defer,A}, the alternative of acquiring no benefits and incurring no costs, position (0,0) is explicit. Thus, it is known and available and E{defer,A} = S{defer,A}. In forced-choice set S{A,C}, position (0,0) is implicit. Thus, it is known but unavailable and E{defer,A,C} $\neq$ S{A,C}. A similar argument holds for trinary sets. In free-choice set S{defer,A,C}, position (0,0) is explicit. In forced-choice set S{A,B,C}, position (0,0) is implicit. As a result, forced-choice sets have evaluation sets with at least one implicit element. Hence, forced-choice sets are always implicit sets. Free-choice sets are implicit sets only when relevant but unavailable products are used as components of the corresponding evaluation sets.

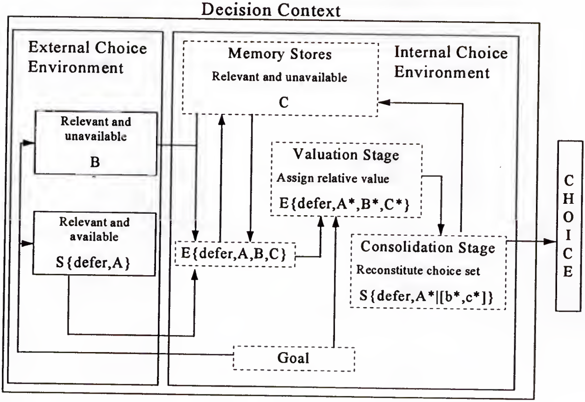


Figure 3-1. Decision event encompassing a discrete decision context where relevant information provided by unavailable products B and C is being used to evaluate S{defer,A}.

Decision-Making Process

Processing stages

The choice process is comprised of two stages: a valuation stage that assigns a relative value per option in {E} and a consolidation stage that uses the valuation stage output--shown in Figure 3-1 as E{defer,A*,B*,C*}--to perform a relative value rank-order of the available options. The resultant implicit set, S{defer,A*||[b*,c*]}, is used to make the final choice.

Processing common product-attribute information

Common product-attributes. In accord with current theory, relative value theory assumes decision-makers are able to distinguish between the presence and absence of specific attributes across alternatives (e.g., Hauser and Shugan, 1983; Hauser and Simmie, 1981; Lancaster, 1971; Srinivasan, 1982). In a similar manner, decision makers can distinguish one product class from another (see Hauser and Shugan, 1983; Hauser and Simmie, 1981; Lancaster, 1971; Srinivasan, 1982). Products having relevant benefits in common are perceived as belonging to the same product class. Because the relevancy of an attribute is determined by the decision goal, the importance given to common attributes is constant across products within the same decision event (see Lancaster, 1966; Ben-Akiva and Lerman, 1985; Tversky and Simonson, 1993).

Diminishing marginal sensitivity. Across decision contexts, the general level of response depends on the intensity of the prominent stimulus (see Shepherd, 1990; Braitenberg, 1994). Within decision contexts, decision-makers detect differences in the magnitude of the alternatives' common attributes (Thurstone, 1927). Moreover, they respond to each evaluated attribute 's marginal increase in proportion to the initial level of that attribute--as the initial level increases, sensitivity to a one-unit increase in the attribute diminishes (see Boring, 1950; Ruch, 1960). The reciprocal relationship also holds--as the initial level decreases, sensitivity to a one-unit increase in the attribute increases.

The Proportional Rate of Exchange Hypothesis

Assessment of trends in relative value

Decision-makers construct attribute tradeoff rates (also see Hauser and Shugan, 1983; Simonson and Tversky, 1992; Tversky and Simonson, 1993). In relative value theory, such attribute tradeoff rates take the form of proportional rates of exchange. The proportional rate of exchange measure represents the contrast of separate rates of diminishing marginal sensitivity of intra-set benefits and costs.

The proportional rate of exchange hypothesis implies that consumers attend to choice options' attribute levels and to those attributes' contextual structural relationships. Such relationships are used to assess relative value and relative value trends. Prior to constructing a preference relation, decision-makers pay particular attention to whether across benefit-positions relative value is rising or falling, at an increasing or at a decreasing rate. When the trend in relative value is perceived as increasing, consumers develop the expectation that incremental units of benefit on average will tend to appreciate in value or, at worst, maintain their initial value. When the trend in relative value is perceived as decreasing, consumers' expectation are that incremental benefit-units on average will tend to depreciate in value. These intra-set trends in relative value are measured in proportional-rates-of-exchange-units. Thus, the pairwise proportional rate of exchange between two tradeoff-mates is fundamental to preference formation and choice.

To better appreciate how the proportional rate of exchange measure captures changes in relative value, we need to express Equation 1.4 (Chapter 1) in a form that is amenable to relative value analysis, i.e., in terms of value measures.

Traditionally, value has been defined as a net-benefit-to-price ratio as depicted in Chapter 2, Equation 2.3. Relative value theory defines value at a more general level. Price is one of any number of cost attributes that may be part of a decision context. As a consequence, the absolute

value measure represented by Equation 2.3 differs fundamentally from the concept of a value measure used in relative value theory.

A value rate is the ratio of a benefit-interval to a cost-interval that yields a rate of benefit accrual per cost-unit increase over the specified benefit-cost area. By assumption, trading up from a lower benefit position to a higher benefit position is desirable. For example, consider {A1,C1}, previously shown in Chapter 2, Figures 2-2 and 2-3. The "(0)" in BenefitA1(0) and CostA1(0) signifies the position from which the marginal increase in either benefit or cost is assessed. BenefitA1(0) is the incremental amount of benefit derivable from acquiring A1 and represents the positive benefit interval 0→BenefitA1(0) = 1024K. CostA1(0) is the incremental amount of cost to be incurred by acquiring A1 and represents the positive cost interval 0→CostA1(0) = $2048. The ratio of these two attribute-intervals yields A1's absolute-value rate:

(3.1) $$ValueA1(0) = \frac{(BenefitA1(0) - 0)}{(CostA1(0) - 0)} = \frac{(1024K - 0K)}{(\$2048 - 0\$)} = .50\text{K/\$}.$$

Common and unique elements

Common value rate: The absolute-value rate of the low-benefit product. Brands within a product class have many attributes in common that may differ in their magnitudes. Hollman and Lynch (1997) conjecture that consumers determine if the incremental benefits yielded by a higher-benefit product are sufficient to merit incurring its attendant incremental costs by using a lower-benefit product's absolute-value rate.

As can be seen in Figure 3-2, A1's benefit and cost intervals, and therefore its absolute-value rate, are contained within C1's benefit and cost intervals and absolute-value rate. Thus, ValueA1(0) is a value-rate that is "common" to both A1 and C1.

Unique-value rate: The incremental value-rate of the higher-benefit product. Consumers perceive C1's benefit level as a composite interval that is decomposable into the sum of a low-common benefit interval, BenefitA1(0), held by both A1 and C1, and a higher, unique benefit interval, BenefitC1_{Hi}(A1_{Lo}), that is held solely by C1.

(3.2) BenefitC1(0) = BenefitA1(0) + BenefitC1_{Hi}(A1_{Lo}).

Similarly, C's cost level is perceived as decomposable into the sum of low-common cost interval, CostA1(0), and higher-unique cost interval, CostC1_{Hi}(A1_{Lo}):

(3.3) CostC1(0) = CostA1(0) + CostC1_{Hi}(A1_{Lo}).

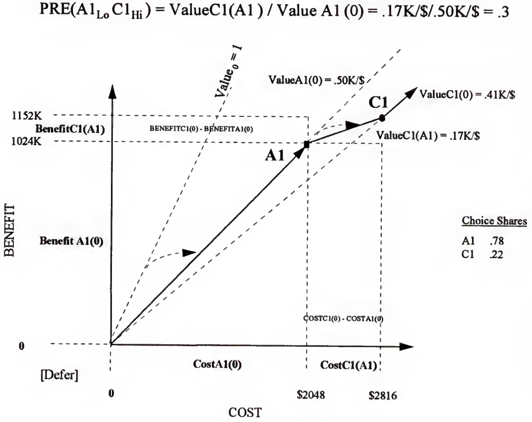


Figure 3-2. The relative value relation of C1 to A1 is measured by their pairwise proportional rate of exchange: PRE(A1C1). Source: Hollman and Lynch, 1997.

Because A1 is known, C1's absolute-value rate, ValueC1(0), by appearing to incorporate both a common and a unique component, appears to be a "blend" of the two. By using information provided by A1, C1's absolute-value rate can be partitioned into an initial "common-rate" and an incremental "unique-rate." C1's unique rate is the ratio of its incremental benefit-interval to its incremental cost-interval:

$$(3.4) \quad \text{ValueC1(A1)} = \frac{BenefitC1(A1)}{CostC1(A1)}.$$

In Figure 3-2, the slope of the solid line connecting computers A1 and C1 shows ValueC1Hi (A1Lo).

Contrasting a unique-value rate to a common-value rate

Partitioning C1's value rate into an initial common rate and an incremental, unique rate permits the construction of a proportional rate of exchange that allows the evaluation of the unique rate's relative value:

$$(3.5) \quad \text{PRE}(\text{A1}_{\text{Lo}}\text{C1}_{\text{Hi}}) = \frac{[BenefitC1(0) - BenefitA1(0)]}{[CostC1(0) - CostA1(0)]} \bigg/ \frac{[BenefitA1(0) - 0]}{[CostA1(0) - 0]}$$

$$= \frac{ValueC1_{Hi}(A1_{Lo})}{ValueA1_{Lo}(0)} = \frac{0.17K/\$}{0.50K/\$} = 0.3.$$

(a) The denominator is the ratio of incremental benefits to incremental costs moving from an initial reference state at position (0,0) to the first known product-benefit position (BenefitA1,CostA1), yielding ValueA1(0). (b) The numerator is the ratio of the incremental benefit to the incremental cost of the unique A1→C1 interval, ValueC1_{Hi}(A1_{Lo}). And, (c) PRE(A1C1) = .3 signifies C1's unique value is only three-tenths of the common value. Thus, C1's incremental benefit-units would appear to depreciate in value, making C1 seem like a poor choice.

Note that the PRE measure would be sensitive to changes in C1' relative value even while maintaining the same absolute value rate. We can do this by "sliding" C1 down its value vector. As C1 approaches 1024K, A1's benefit position, C1's incremental benefits would be very small relative to its incremental cost; PRE(A1C1) would decrease further, making C1 a relatively worse choice at this position. Now, assume we move C1 up its value-vector. As it moves up, its unique rate approximates its common rate; PRE(A1C1) would approximate a value of 1, making C1 a relatively better choice at this new position. In a similar fashion, holding C1's position constant while "sliding" A1 on its value-vector, either down towards (0,0) or up towards C1's benefit position, would also have a substantive impact on C1's perceived relative attractiveness. Because

the magnitude of [ValueC1(0) - ValueA1(0)] would remain constant at -.09 in all cases, this value-vector-difference measure would not be able to predict such shifts in relative attractiveness.

Of course, incremental ValueC1$_{Hi}$(A1$_{Lo}$) is none other than the linear pairwise tradeoff rate (see Equation 1.3 in Chapter 1) posited by Tversky and Simonson (1993; Simonson and Tversky, 1992) to be an important component of tradeoff contrast, but to have no direct effect in simple binary choice sets. In contrast, relative value theory considers the unique rate, ValueC1$_{Hi}$(A1$_{Lo}$), as well as the common rate, ValueA1(0), to be important determinants of product-preference even in simple binary choice.

Although the key idea is similar to the concept of "local contrast" advanced by Simonson and Tversky (1992), the proportional rate of exchange suggests that what consumers compare are ValueC1$_{Hi}$(A1$_{Lo}$)--the unique A1→C1 high-benefit interval's marginal rate--to ValueA1$_{Lo}$(0)--the common 0→A1 low-benefit interval's marginal rate.

The derivation and incorporation of absolute rate, ValueA1(0), and of incremental rate, ValueC1$_{Hi}$(A1$_{Lo}$), into the decision framework in relative value theory devolves directly from two fundamental assumptions: (a) diminishing marginal sensitivity affects each attribute independently and (b) consumers perform benefit-cost tradeoffs. The proportional rate of exchange measure attempts to model the process of comparing the common and unique value rates during the valuation stage (see Figure 3-1).

Context-dependent interpretation of value rates and proportional rates of exchange

Consumers' interpretation of a constant magnitude of a unique-rate, denoted ValueHi(Lo), depends on the magnitude of the initial common-rate, denoted ValueLo(0). Hence, the interpretation given an incremental value rate is always context "dependent." The three choice studies depicted in Figure 3-3 illustrate this insight.

Note the increasing magnitude of PRE(LoHi) for the three choice sets as a result of controlling the unique-rate, ValueHi(Lo) = .17, while varying each set's common-rate, ValueLo(0). The choice data suggest a monotonic relationship between the magnitude of PRE(LoHi) and the

degree of attractiveness elicited by the expensive C brand in each set: [PRE(A1C1) = .3 < PRE(A3C3) = 1.0 < PRE(A2C2) = 4.0] v. [P(C1|A1) = .22 < P(C2|A2) = .63 < P(C3|A3) = .71].

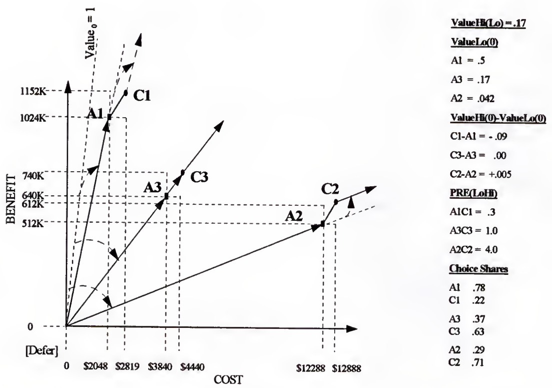


Figure 3-3. Increases in the contextual proportional rate of exchange increases the relative attractiveness of a set's high-benefit, high-cost C brand.

In the next two sections, I review experimental and meta-analytic studies using forced-choice binary sets that lend support to the proportional rate of exchange hypothesis.

Support for the Proportional Rate of Exchange Hypothesis in Binary Forced-Choice[1]

Experiment 1

Using binary dental insurance sets of form $\{A_{Lo}, C_{Hi}\}$, modeled after insurance plans used by Simonson and Tversky (1992), Hollman and Lynch (1997) varied Proportional Rate of

[1] Tables for this section and the following section appear at the end of the chapter.

Exchange($A_{Lo}C_{Hi}$) (.25 vs. 2.00) and ValueC_{Hi}(A_{Lo}) (.20 %-coverage/premium, 1.0 %-coverage/premium). Table 3-1 shows the stimuli, stimulus design, and high-benefit option C's shares. The %-coverage levels for brands A and C were kept constant. The experimental manipulations of Proportional Rate of Exchange(ALoCHi) and of ValueCHi(ALo) were accomplished by varying the cost of each insurance brand.

As expected, the main effect of PRE($A_{Lo}C_{Hi}$) was the only significant effect, 1.14, $\chi^2_{(1)} = 36.34$, $p < .01$, N = 204. Irrespective of the magnitude of ValueC_{Hi}(A_{Lo}), increasing PRE($A_{Lo}C_{Hi}$) from .25 to 4.0 increased the proportion of respondents choosing high-benefit, high-cost C by .43.

Experiment 2

Hollman and Lynch replicated Experiment 1 and extended it by varying the extremity of Proportional Rate of Exchange within PRE-diagnostic levels: PRE > 1 and PRE < 1. They used 22 personal computer choice-pairs like those used by Simonson and Tversky (1992). The specific stimuli and choice shares for C are shown in Table 3-2 (N = 435). The choice-pairs were constructed such that Proportional Rate of Exchange($A_{Lo}C_{Hi}$) varied over 4 broad levels: PRE($A_{Lo}C_{Hi}$) $\leq .5$, $.5 <$ PRE($A_{Lo}C_{Hi}$) < 1, $1 <$ PRE($A_{Lo}C_{Hi}$) ≤ 3, and $3 <$ PRE($A_{Lo}C_{Hi}$). Incremental ValueC_{Hi}(A_{Lo}) was kept constant at either .13 or 2.0 while ValueA(0) was allowed to vary.

As expected, the proportion choosing high-benefit, high-cost C increased monotonically with Proportional Rate of Exchange($A_{Lo}C_{Hi}$): .15, .26, .79, and .92, respectively. In addition, each adjacent pair of proportions differed significantly by 1-tail tests, $Z = 1.7$, $p < .05$; $Z = 8.1$, $p < .01$; $Z = 3.0$, $p < .01$, respectively.

Experiment 3

Hollman and Lynch (1997) replicated Experiment 1 by using three product classes employed by Simonson and Tversky (1992): personal computers, dental insurance, and tires. They extended Experiment 1 by systematically varying Proportional Rate of Exchange($A_{Lo}C_{Hi}$) and Incremental ValueC(A) levels. The stimuli, stimulus design, and option C's shares are shown in

Table 3-3. Product-class was crossed with Proportional Rate of Exchange($A_{Lo}C_{Hi}$) [PRE($A_{Lo}C_{Hi}$) < 1, PRE($A_{Lo}C_{Hi}$) = 1, or PRE($A_{Lo}C_{Hi}$) > 1] and Incremental ValueC_{Hi}(A_{Lo}) [low, medium, or high].

Results showed significant main effects of Proportional Rate of Exchange($A_{Lo}C_{Hi}$) and of Product Class, $\chi^2_{(1)} = 45.5$, $p < .01$ and $\chi^2_{(1)} = 14.5$, $p < .01$, respectively ($N = 219$). The proportion choosing C increased monotonically with Proportional Rate of Exchange($A_{Lo}C_{Hi}$): .32, .71, and .88 respectively for PRE($A_{Lo}C_{Hi}$) < 1, PRE($A_{Lo}C_{Hi}$) = 1, and PRE($A_{Lo}C_{Hi}$) > 1. The latter two proportions were only marginally different from each other ($p < .10$).

The main effect of Product Class was due to respondents' significant lower preference for the more expensive computer (48%) than for either the more expensive dental insurance (70%) or tire (71%). Note that in Table 3-3, the main effect of Product Class reflects an underlying regularity associated with the 0→A interval's common-rate, ValueA(0). While it is true that higher values of Proportional Rate of Exchange were associated with higher probability of choosing C, the effect was not uniform. When PRE(AC) ≥ 1, indicating that relative value increases in high-benefit, high-cost C's unique benefit-cost interval, people uniformly tend to choose C as predicted. But when PRE(AC) < 1, indicating that relative value decreases in C's unique benefit-cost interval, choice also depends on whether ValueA(0) ≥ 1 or ValueA(0) < 1.

Hollman and Lynch referred to choice pairs whose objective costs were greater than their benefits--represented by ValueA(0) < 1--as being located in the "aversive region." These would be sets such as those depicted in Figure 3-3. They referred to those pairs whose objective costs were equal to, or less than, their benefits as being located in the "attractive region." Examples of these would be the sets within the product class Tires with ValueA(0) ≥ 1 in Table 3-3.

When common-rate ValueA(0) is less than one, the perception is one of a general benefit-deficit. When PRE(AC) is also less than one, incremental benefit-units appear to depreciate even more; Hence, people prefer low-benefit, low-cost A due to the overwhelming benefit-deficit. This situation is illustrated by set {A1,C1} in Figure 3-3.

On the other hand, when ValueA(0) is greater than one, the perception is one of a general benefit-surplus. If PRE(AC) is less than one, it indicates incremental benefit-units depreciate from the high common-value rate. However, since both rates are subsumed in C's value rate, there are still excess benefits to be realized by moving to the C brand, albeit at a lower rate. This perception should be heightened for higher common-rates. This would make C appear to be a desirable choice for some people. As a result, respondents choose the more expensive brand about half the time. Hollman and Lynch tested for this effect of "region" via the meta-analyses to be discussed next.

Meta-analyses of binary choice data

Meta-analysis I. Recall from Chapter 2 that, in Tversky and Simonson's (1993) componential context model, ValueHi(Lo) is viewed as critical to explaining context effects due to "background contrast." But, the componential context model does not differ from other marketing models that assume the IIA property and use [ValueC(0) - ValueA(0)] to estimate choice probabilities from choice data under two conditions: when consumers lack experience choosing from a product class or when a previously learned incremental rate is the same as the current one. In contrast, relative value theory provides a testable decision rule for predicting choice shares for binary sets' brands prior to choice: as PRE(LoHi) increases, the proportion of consumers preferring high-benefit, high-cost C should also increase.

Table 3-4 shows a summary of 49 binary studies using 19 different product classes, based on 4,064 respondents in total. Hollman and Lynch (1997) culled these studies from published and working papers of seven choice researchers. These theorists had used the studies as control sets against which to test for context effect on subsequent choice behavior. The inclusion criteria were: (a) forced-choice binary sets of form {A,C}; (b) products had to have been described to respondents in terms of a benefit and a cost; and (c) the levels of each attribute had to be specific enough to allow the calculation of the proportional rate of exchange measure according to Equation 3.5.

Hollman and Lynch correlated probability of choosing high-benefit option C, P(C|A), with PRE(AC), [ValueC(0) - ValueA(0)], and ValueC(A) across the 49 studies. Results were as follows: (a) PRE(AC) correlated significantly with P(C|A), $r = .60$, $t_{(47)} = 5.14$, $p < .001$; (b) [ValueC(0) - ValueA(0)] correlated marginally with P(C|A), $r = .24$, $t_{(47)} = 1.70$, $p = .097$; (c) a test of the difference between the prior two dependent correlations showed that P(C|A) was significantly more strongly correlated with PRE(AC) than with [ValueC(0) - ValueA(0)], $Z = 2.36$, $p < .02$ (Rosenthal and Rosnow, 1991, p.508); (d) ValueC(A) did not correlate significantly with P(C|A), $r = .22$, $t_{(47)} = 1.55$, $p > .10$; (e) a test of the difference between the two dependent correlations, [PRE(AC),P(C|A)] and [ValueC(A),P(C|A)], showed that P(C|A) was significantly more strongly correlated with PRE(AC) than with ValueC(A), $Z = 2.79$, $p < .01$. The theorists were unaware of this remarkable regularity in the choice patterns elicited by their studies.

Meta-analysis II. To the 49 pairs from the literature, Hollman and Lynch then added the 53 choice pairs from the experiments reviewed above, for a combined total of 102 choice pairs and 4,922 respondents. They tested the following model:

(3.6) $\quad P(C|A) = \beta[\ln PRE(AC)] + \alpha; \quad 0.0 \leq P(C|A) \leq 1.0,$

where $\alpha = .61$ and $\beta = .16$, $t = 4.79$, $p < .01$.

The intercept, α, estimates respondents' probability of choosing C when ln[PRE(AC)] = 0, indicating PRE(AC) = 1. Set {A3,C3} in Figure 3-3 exemplifies this type of relative value structure--note that A3 and C3 are on the same value-vector, hence, the common and unique rates are equal. The estimated value of $\alpha = .61$ was significantly greater than .50 ($t = 5.9$, $p < .01$), suggesting that respondents tended to choose higher-cost C when the unique and common rates were equal irrespective of the set's region location: aversive, ValueA(0)<1, or attractive, ValueA(0)≥1. The estimated slope, $\beta = .16$, indicates the level by which increasing ln[PRE(AC)] increased the probability of choosing high-benefit, high-cost C ($r = .71$).

As for the smaller data set, PRE(AC) model fit significantly better than models predicting P(C|A) as a function of either [ValueC(0) - ValueA(0)] or ValueC(A) ($Z = 3.74$, $p < .01$ and $Z =$

3.8, $p < .01$). However, Hollman and Lynch found, that they could improve predictive accuracy ($R^2 = .60$) by a model that included the effect of "region," represented by the magnitude of ValueA(0), and the interaction of region with PRE(AC):

(3.7) $P(C|A) = \alpha + \beta_1$ [ln PRE(AC)] + β_2 [ln ValueA(0)] + β_3 [ln PRE(AC)* ln ValueA(0)],

where, $\alpha = .60$, $t = 5.3$, $p < .01$; $\beta_1 = .18$, $t = 12.1$, $p < .01$; $\beta_2 = .01$, $t = 2.3$, $p < .05$; and $\beta_3 = -.018$, $t = 3.81$, $p < .01$.

Table 3-5 displays the results of this meta-analysis by PRE level and region: "aversive" where ValueA(0) < 1 and "attractive" where ValueA(0) ≥ 1. The significant coefficient for the interaction term, $\beta_3 = -0.018$, supported Hollman and Lynch's claim that people choose the cheaper option mainly when PRE(AC) < 1 and ValueA(0) < 1. This relationship is clearly seen in Table 3.

In the attractive region, represented by ValueA(0) ≥ 1, the raw benefit-to-cost ratio of the options indicates a benefit surplus is likely, thereby increasing the overall attractiveness of obtaining higher benefits. The aversive region, represented by ValueA(0) < 1, indicates a benefit deficit is likely, thereby decreasing the overall attractiveness of obtaining higher benefits.

The proportion choosing the expensive C brand (.56) was significantly higher when sets were located in the attractive region than the proportion (.52) choosing C when sets were in the aversive region ($Z = 2.46$, $p < .05$). These tendencies are reflected in the significant coefficient for factor ValueA(0): $\beta_2 = 0.01$. This result was due to the affinity respondents had for the surplus benefits realizable in the attractive region.

When PRE ≥ 1, C's unique rate is equal or higher than its common rate and consumers perceive incremental benefit-units appreciate relative to the common-rate. This perception heightens the attractiveness of high-benefit high-cost C. But when PRE < 1, C's unique rate is lower than its common rate and consumers perceive incremental benefit-units depreciate relative to the common rate. As a result, the proportion (.74) choosing the C brand when PRE ≥ 1 was significantly greater than the proportion opting for C when PRE < 1 ($P(C|A) = .44$; $Z = 21.3$, $p <$

.01). This strong relationship between preference for the C brand and PRE level is reflected in the estimated significant coefficient for the PRE factor: $\beta_1 = 0.18$.

Nonetheless, due to the affinity respondents had for the surplus benefits realizable in the attractive region, when PRE< 1, the effect depended on the region location of the sets. While 51% of respondents opted for the more expensive C brands when the set was located in the attractive region (ValueA(0) ≥ 1), a significant lower percent, 39%, found the C brand attractive when choice sets were located in the aversive region (ValueA(0) < 1), $Z = 7.16$, $p < .01$.

In contrast, when PRE ≥ 1, the preference for the more expensive C brand did not depend on choice set location. Seventy-eight percent of respondents choosing from sets located in the attractive region opted for the C brand while 73% of those selecting from sets located in the aversive region chose the C brand. Both groups exhibited a significant preference for high-benefit C ($Z_{Ho: P(C|A) > .5} = 12.4$, $p < .01$ and $Z_{Ho: P(C|A) > .5} = 18.23$, $p < .01$, respectively). Also, the overall effect of PRE level was stronger than the region effect on the probability of choosing C ($Z = 3.69$, $p < .01$).

To summarize, preference for high-benefit, high-cost C was at its highest (.78) when the choice set was located in the attractive region (ValueA(0) ≥ 1), where there are surplus benefits, and PRE ≥ 1, implying incremental benefit-units appreciate above an already high common-rate. The preference for C was at its lowest (.39) when the choice set was located in the aversive region (ValueA(0) < 1), where there are deficits in benefits, and PRE < 1, implying incremental benefit-units depreciate below an already low common rate. As in the simpler model, intercept, $\alpha = .60$, indicated respondents significant tendency to prefer the expensive brand irrespective of region when PRE(AC) = 1, and, therefore, the unique and common rates are equal.

I now turn to an analysis of how the proportional rate of exchange model explains context effects in trinary sets.

Implications of the Proportional Rate of Exchange Hypothesis for Trinary Forced-Choice

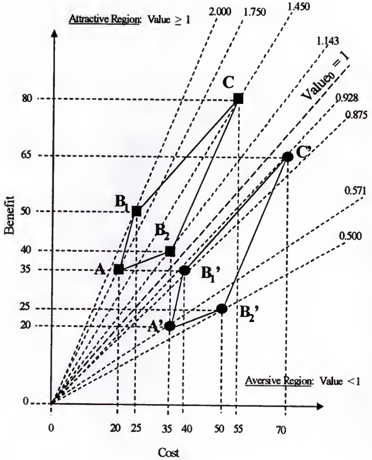
Impact of Adding a Third Alternative to a Binary Choice Set

The main difference between binary and trinary forced-choice sets is that in trinary choice decision-makers construct and use three product-pairs' proportional rates of exchange--PRE(LoMed), PRE(LoHi), PRE(MedHi)--rather than just one--PRE(LoHi). Through a process similar to the concept of local contrast (Simonson and Tversky, 1992), decision-makers compare these three proportional rates of exchange to determine the option offering the best relative value. Thus, trinary sets' product-choice patterns are largely dependent on the tripartite structural configuration created by the three proportional rates of exchange.

Recall that the presence of A2 did not change the magnitude of ValueC2(0) in Figure 3-3. Similarly, adding some intermediate product--e.g. adding B_1' to forced-choice set {A',C'} in Figure 3-4 (originally shown in Chapter 1)--does not change the structural relationship of the original pair represented by PRE(A'C'). What it does do, however, is augment the information available in the evaluation set. The additional information is used to perform a more refined assessment of the relative value offered by higher-benefit brands.

Partitioning the Higher-Benefit Brands' Absolute Value Rates: ValueMed(0) and ValueHi(0)

When all brands are considered simultaneously in a trinary setting, e.g., $\{A'_{Lo},B_1'_{Med},C'_{Hi}\}$ in Figure 3-4, the benefit and cost levels of the two higher-benefit brands, $B_1'_{Med}$ and C'_{Hi}, are perceived as decomposable into common and unique intervals--refer to Figure 3-5. This parallels the process in binary settings where the lone higher-benefit C'_{Hi} was also perceived as decomposable into common and unique intervals. Figure 3-5 shows a schematic representation of set $\{A'_{Lo},B_1'_{Med},C'_{Hi}\}$'s total benefit interval, $0 \rightarrow C'_{Hi}$, and the interrelationship of its common and unique elements.



Incremental Value (IV)

ValueB$_1$(A) = 3.0 ValueB$_1$'(A') = 3.0
ValueB$_2$(A) = 0.3 ValueB$_2$'(A') = 0.3
ValueC(A) = 1.3 ValueC'(A') = 1.3
ValueC(B$_1$) = 1.0 ValueC'(B$_1$') = 1.0
ValueC(B$_2$) = 2.0 ValueC'(B$_2$') = 2.0

Absolute Value (AB)

ValueA(0) = 1.750 ValueA'(0) = 0.571
ValueB$_1$(0) = 2.000 ValueB$_1$'(0) = 0.875
ValueB$_2$(0) = 1.143 ValueB$_2$'(0) = 0.500
ValueC(0) = 1.450 ValueC'(0) = 0.928

Proportional Rate of Exchange = IV/AB

PRE(AB$_1$) = 3.0/1.75 = 1.71
PRE(AC) = 1.3/1.75 = 0.73
PRE(B$_1$C) = 1.0/2.000 = 0.50
PRE(B$_2$C) = 2.0/1.143 = 1.75
PRE(A' B$_1$') = 3.0/0.571 = 5.25
PRE(A'C') = 1.3/0.571 = 2.27
PRE(B$_1$'C') = 1.0/0.875 = 1.14
PRE(B$_2$' C') = 2.0/0.500 = 4.00

Figure 3-4. Sets with identical incremental values and equal absolute value rank orders but with dissimilar PRE-structural configurations due to their location in different regions of the decision space.

Each numeral within a square bracket gives the size of its corresponding benefit-interval or sector in benefit-units. For example, [65] represents the size of the total benefit interval, i.e., the maximum level of benefit obtainable in the set. Each interval's or sector's value-rate name and magnitude appears below its corresponding interval's benefit size. For example, ValueC'(B') = 1.0 is the value rate for the unique benefit interval B$_1$'$_{Med}$→C'$_{Hi}$ and it appears below the size of this interval, [30]. In addition, the set's proportional rates of exchange, along with their magnitudes, appear in the left-hand column. Each proportional rate of exchange is positioned alongside its two

component rates. For example, PRE(MedHi) = 1.14, is the ratio of the Unique rate to the Common rate: ValueC'(B_1')/ValueB_1'(0). All information shown in Figure 3-5 about set {A'$_{Lo}$,B_1'$_{Med}$,C'$_{Hi}$} may also be found in Figure 3-4.[2]

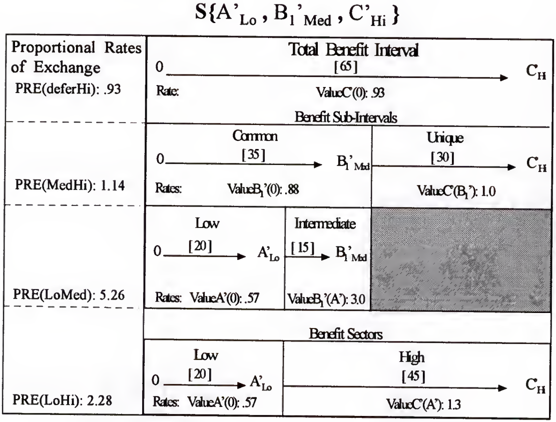


Figure 3-5. Partitioning of set {A'$_{Lo}$,B_1'$_{Med}$,C'$_{Hi}$}'s high-benefit option's absolute-value rate into its common and unique components given that the set's two lower-benefit options are known to decision-makers.

Intermediate-benefit interval average rate: ValueMed(0)

As we have seen, ValueA'(0) represents the relative value trend for the 0→A'$_{Lo}$ low-benefit interval. In a similar fashion, absolute-rate ValueB_1'(0) represents the trend in relative value for interval 0→B_1'$_{Med}$ in the absence of information on lower-benefit brands. In

2 Unless otherwise indicated, the ensuing discussion refers to Figure 3-5.

$\{A'_{Lo}, B_1'_{Med}, C'_{Hi}\}$, ValueMed(0) is given by ValueB_1'(0). However, once A' is known, ValueB_1'(0), is perceived as a <u>composite rate</u> that can be partitioned in order to evaluate the relative value of its unique benefit-interval.

The $0 \rightarrow B_1'_{Med}$ benefit or cost interval is each decomposable into the sum of two sub-intervals: (a) low-common $0 \rightarrow A'_{Lo}$ interval and intermediate-common $A'_{Lo} \rightarrow B_1'_{Med}$ interval. The ratio of the corresponding benefit-cost intervals for each of these sub-intervals yields an incremental-benefit value rate:

(a) <u>low-common rate</u> Value A'(0)--denoted ValueLo(0)--for sub-interval $0 \rightarrow A'_{Lo}$

(b) <u>intermediate-common rate</u> ValueB_1'(A')--denoted ValueMed(Lo)--for sub-interval $A'_{Lo} \rightarrow B_1'_{Med}$.

<u>Total-benefit interval average rate: ValueHi(0)</u>

By definition, the option holding the highest benefit-position in the set is associated with the maximum or <u>total-benefit interval</u> available in the choice set: 0→ Hi-benefit. The value rate for this interval is ValueHi(0). In $\{A'_{Lo}, B_1'_{Med}, C'_{Hi}\}$, the total-benefit interval is $0 \rightarrow C'_{Hi}$, thus, ValueHi(0) is given by Value C'(0).

Just as ValueA'(0) does for low benefit-interval $0 \rightarrow A'_{Lo}$, and ValueB_1'(0) does for <u>intermediate benefit-interval</u> $0 \rightarrow B_1'_{Med}$, absolute-rate ValueC'(0) represents the trend in relative value for <u>high benefit-interval</u> $0 \rightarrow C'_{Hi}$ in the absence of information on lower-benefit brands.

Whereas C'_{Hi}'s benefit and cost levels would be partitioned into two intervals in $\{A'_{Lo}, C'_{Hi}\}$, the richer information provided by the introduction of $B_1'_{Med}$ into the set allows a finer partitioning. Newly "extreme" C_{Hi}'s attribute levels are partitioned into three intervals:

(a) low-common intervals, $0 \rightarrow A'_{Lo}$, held in common with A'_{Lo}, and $B_1'_{Med}$; whose value rate is ValueLo(0);

(b) intermediate-common intervals, $A'_{Lo} \rightarrow B_1'_{Med}$, held in common with $B_1'_{Med}$, whose value rate is ValueMed(Lo); and,

(c) unique intervals, $B_1'_{Med} \rightarrow C'_{Hi}$, held only by C'_{Hi}, whose value rate is unique rate ValueC'(B_1')-- denoted ValueHi(Med).

Thus, as a result of having acquired knowledge about two lower-level brands, A' and B_1', ValueC'(0) is now perceived as a composite of three incremental-benefit rates: the low-common rate, the intermediate-common rate, and the high-unique rate.

This is an important insight. Each higher-benefit brand's absolute value appears to be a composite of the value rates of brands having lower-benefit positions. Thus, their "true" relative value cannot be appraised without partitioning the "influence" of lower-benefit brands.

Construction of PRE(LoHi), PRE(LoMed), PRE(MedHi)

The within-set trend in relative value: PRE(LoHi)

Partitioning the set's highest benefit-position at C' into a low benefit-sector and a high benefit-sector permits the construction of proportional rate of exchange PRE(LoHi). This proportional rate of exchange serves to assess the within-set trend in relative value:

(a) Low benefit-sector. The low benefit-sector incorporates the $0 \rightarrow A'_{Lo}$ interval and represents the set's lowest benefit position. By definition, its rate, ValueA(0), is common to both $B_1'_{med}$ and C'_{Hi}. and represents the composite value rate for A' and any other potentially existing low-benefit brands at, or below, A's benefit position. Thus, ValueA(0) is used as the expected relative value rate.

(b) High benefit-sector. The high benefit-sector incorporates the $A'_{Lo} \rightarrow C'_{Hi}$ interval and represents the maximum benefit-cost tradeoff in the current set. Hence, this sector subsumes the intermediate-common intervals and the unique intervals. Its incremental-value rate, ValueC'$_{Hi}$(A'_{Lo}), is a composite rate that provides information about the average value of he incremental benefit-units associated with the two higher-benefit brands, $B_1'_{med}$ and C'_{Hi}.

Recall how in binary choice the lone common rate, e.g., ValueA1(0) in Figure 3-2, was used to construct proportional rate of exchange PRE(A1C1) in order to evaluate high-benefit C1's unique value component. In a similar manner, Value A'(0), is used to assess the desirability of trading up to the high benefit-benefit sector: to position $B_1'_{Med}$ or to position C_{hi}. This is accomplished by contrasting ValueA'(0) to the high benefit-sector's composite rate, ValueC'(A'). This contrast yields PRE(LoHi).

Because its absolute-value rate is used as the expected relative value rate, the low-benefit A brand represents the "average" brand. As a result, A's choice is perceived as a "fall-back" position--i.e., A is chosen only when "nothing else seems better." To the extent that benefits motivate acquisition transactions, the high benefit-sector brands in a set are those to which consumers aspire. As I discuss in the next section, consumers proactively consider the relative best of the high benefit-sector brands by further refining the differentiating process.

Assessing Relative Value Via a Tripartite Structural Configuration:

PRE(LoHi). Corresponding to the $A_{Lo} \rightarrow C_{Hi}$ benefit-cost interval, PRE(LoHi) provides information on the maximum benefit-cost tradeoff in the set. The magnitude of PRE(LoHi) engenders expectations about the general trend in relative value within the evaluation set. All else equal, the likelihood that C is chosen over A increases as PRE(LoHi) approaches or exceeds one; the likelihood that C is chosen over B_k is monotonic with increases in PRE(MedHi).

When this general-trend rate is of type PRE(LoHi)<1, a deficit condition expectation is set up. Examples of sets with deficit PRE(LoHi) are [{A,B_k,C}, k = 1,2] in Figure 3-4. A deficit general trend in a set indicates that, on average, absolute value tends to decrease with increases in benefits from its level at the low-benefit position. Thus, they produce a negative local evaluative context.

Through contrast, deficit PRE(LoHi) rates increase the subjective attractiveness of high-benefit C while diminishing that of intermediate-benefit B_k when the set's structural form is

[PRE(LoMed) < PRE(LoHi) < 1 | PRE(MedHi) > 1]. Set {A,B_2,C} in Figure 3-4 provides an example: [PRE(A,B_2) = .17 < PRE(AC) = .73 < 1 | PRE(B_2C) = 1.75 > 1]. The expected rate of incremental benefit-unit depreciation is -.27 (=.73 - 1). Because incremental benefit-units depreciate at a faster than expected rate within the intermediate-common A→B_2 interval (-.83 v. -.27), while they surprisingly appreciate within the high-unique B_2→C interval (+.75), intermediate B_2's attractiveness is greatly reduced in comparison to C. Because B_2 is known, C's attractiveness in the trinary set is greater than in binary set {A,C}. The resultant change in C's relative attractiveness exemplifies a polarization context effect.

Deficit limit rates highly favor intermediate B_k options when the set's structural form is: [PRE(LoMed) > 1 > PRE(LoHi) | PRE(MedHi) < 1]. Set {A,B_1,C} in Figure 3-4 has this type of structure: [PRE(A,B_1) > 1.71 > 1 > PRE(AC) = .73 | PRE(B_1C) = .50 < 1]. Since the core-pair [A,C] is constant, again the expected rate of benefit-unit depreciation is -.27. However, in the present case incremental benefit-units depreciate at a faster than expected rate (-.50 v. -.27) within the high-unique B_1→C interval, while they surprisingly appreciate (+.71) within the intermediate-common A→B_1 interval. Thus, B_1's attractiveness is greatly enhanced while that of C is reduced. When the control core-pair used is {A,B_1} and then C is introduced, B_1 does better in the trinary set than in the binary set, thus demonstrating a classic attraction context effect. When the core-pair is {A,C} and then B_1 is introduced, C does worse in the trinary set than in the binary, classifying as a demonstration of the similarity effect.

When this general-trend rate is of type PRE(LoHi)≥1, a surplus condition expectation is set up. Examples of sets with surplus PRE(LoHi) are [{A',B_k',C'}, k = 1, 2] in Figure 3-4. A surplus general trend in a set engenders the expectation that, on average, greater quality at least equal value are both obtainable by trading up from the low-benefit position. Thus, they produce a positive local evaluative context.

The attractiveness of C relative to the other two options is enhanced because both value and benefit are increasing in each of the set's intervals. However, in this PRE structure,

intermediate B_k's attractiveness tends to increase as the magnitude of PRE(MedHi) approaches one because the contribution of the $B_k \rightarrow C$ interval to the surplus limit rate decreases proportionately.

PRE(LoMed). All else equal, higher levels of PRE(LoMed) increase the likelihood that intermediate B is chosen. Associated with intermediate-common interval $A_{Lo} \rightarrow B_{Med}$, this rate provides information to assess whether incremental benefit units obtainable by trading up from A_{Lo} to B_{Med} appreciate--PRE(LoMed)>1--or depreciate--PRE(LoMed)<1--relative to the low-common rate. This information is useful in differentiating the better higher-benefit brand. However, the ultimate impact of PRE(LoMed) on the set's choice pattern depends on the set's other two PRE rates and on region location.

PRE(MedHi). Corresponding to high-unique interval $B_{Med} \rightarrow C_{Hi}$, this rate provides information to assess whether incremental benefit units obtainable only by trading up from B_{Med} to C_{Hi}, appreciate--PRE(MedHi)>1--or depreciate--PRE(MedHi)<1--in value relative to ValueB_{Med}(0).

Similarly to PRE(LoMed), higher levels of PRE(MedHi) increase the likelihood that extreme C is chosen. The fact that both A's and B_k's benefits are subsumed in C's benefit position enhance the impact of this rate in situations that heighten the importance of maximizing benefits, especially those wherein decision-makers experience high product-decision urgency (e.g., in forced-choice sets).

Another reason for the high impact of PRE(MedHi) on a set's choice pattern is that its magnitude can be used to disambiguate the relative value of C's unique value in most cases where the products are in a straight line. When brands in a choice set fall on a straight line, the tradeoff rate for the $A \rightarrow B_k$ interval, PRE(LoMed), is always equal to the rate for the maximum $A \rightarrow C$ interval, PRE(LoHi). Note in Figure 3-4 that for PRE(MedHi) to be equal to one, the B_k and C brands must be on the same absolute-value-vector. Hence, the magnitude of higher-benefit interval PRE(MedHi) depends on the degree of proximity of the absolute value vectors of intermediate B_k

and extreme C. The interpretation given these two vector's degree of proximity depends on PRE(LoHi).

The above discussion showed that each of the three proportional rates of exchange constructed in trinary choice provides a different element of the information required to assess the relative best benefit position to take from those available in the set. Hollman and Lynch showed that the within-set relationships of these three proportional rates form specific structural configurations that are associated with distinct patterns of choice. Moreover, as it was true in binary choice, a trinary set's PRE structural configuration depends on the magnitudes of both absolute-value rates and of incremental-value rates. This is why knowledge of the set's absolute-value rank-order or of its incremental-value structure alone is insufficient to predict trinary choice.

The introduction of different context-options into trinary sets may also introduce substantive changes to the implicit structural relationships in the options evaluative set--e.g., changing core-pair [B,C] from low-context $S_L\{A,B,C\}$ to high-context $S_H\{B,C,D\}$. The core-pair's change in benefit-position has substantive effect of how consumers use the information provided by their levels of benefits and costs. In S_L, both B and C comprise the high benefit-sector to which consumers aspire. In S_H, by virtue of being in the low benefit-sector, B is relegated to being the standard or "average" brand to be chosen only if "nothing else is better." Whereas, C, by still being a member of the high benefit-sector, is still proactively considered within the above-average brands. Thus, the reconfigured PRE-structure produces predictable changes in the core-pair's relative-shares across the two set contexts.

Effect of region on trinary choice

Recall that in the "attractive" region, products' objective benefit levels are greater than their objective cost levels; hence, their absolute values are greater than one. In the "aversive" region, the inverse relationship occurs and products' absolute values are less than one. As it did in binary choice, the region effect impacts trinary choice in two ways.

Due to decision-makers' pervasive diminishing marginal sensitivity, a given magnitude of an incremental value rate has a greater impact on products' choice probabilities in the aversive region than in the attractive region. The three binary studies depicted in Figure 3-3 illustrate this effect. Another support for this premise is the significant coefficient of ValueA(0) on C's choice probability in the full model (Equation 3.7) of the binary meta-analysis reviewed in the prior section. Figure 3-4 illustrates this phenomenon in trinary sets. For example, sets $\{A,B_1,C\}$ and $\{A',B_1',C'\}$, with identical incremental-values and equal value rank-order have dissimilar PRE structural configurations because the magnitudes of standard rates ValueA'(0) and $\text{Value}B_1'(0)$ are less than those of their counterparts, ValueA(0) and $\text{Value}B_1(0)$. Thus, these sets elicit significantly different choice patterns.

By definition, the common-rate for all higher-benefit brands located in the attractive region is always one or greater. Thus, the attractive region engenders the expectation that obtaining surplus benefits is likely. All else equal, the perceived positive background relative-value trend fosters a general tendency to seek higher-benefits. As a result, the attractive region provides an overall positive background evaluative context.

In an opposite manner, the common-rate for all higher-benefit brands located in the aversive region is always less than one. Hence, the aversive region engenders the expectation that incurring benefit deficits is likely. All else equal, the perceived negative background relative-value trend fosters a general tendency to avoid higher-benefits. Thus, the aversive region provides an overall negative background evaluative context.

Through a process of contrast, all else equal, the salience of negative new information is heightened when viewed against a positive background. In an opposite manner, all else equal, the salience of positive new information is heightened when viewed against a negative background. Hollman and Lynch argued that the combined effects of region play an important role on whether compromise or polarization is demonstrated when researchers use straight-line trinary choice sets. Subsequently, I report experimental results supporting this contention.

Support for the Proportional Rate of Exchange Hypothesis in Trinary Forced-Choice

Experiment 4

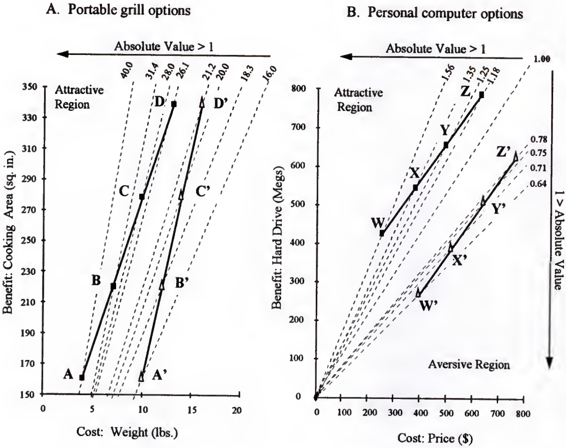


Figure 3-6. Stimulus sets for proportional rate of exchange Experiment 4. Source: Hollman and Lynch, 1997.

Hollman and Lynch (1997) used stimulus sets characterized by the same pair of attributes in the same product class. Contrary to extant theory, they demonstrated that by controlling choice sets' PRE structure and region it was possible to elicit both compromise--the tendency to select intermediate products due to attribute-dependent symmetric extremeness aversion--and polarization--the tendency to select high-benefit brands due to asymmetric extremeness aversion (see Chapter 2; Simonson and Tversky, 1992).

Figure 3-5 shows the experimental design. Respondents were assigned to one cell of a 2 (product class: portable grill v. computer) x 2 (PRE structure: compromise v. polarization) x 2 (core-option positions: Med, Hi v. Lo, Med) x 2 (set type: low-context $\{A_{Lo}, B_{Med}, C_{Hi}\}$ v. high-context $\{B_{Lo}, C_{Med}, D_{Hi}\}$) between-subjects design. Four cells' data for "compromise" portable grill sets {A,B,C} and B,C,D} were originally reported by Simonson (1989). Portable grills were described in terms of size of cooking area (in^2) and of weight (lb.); personal computers were described in terms of amount of memory (Meg) and price ($).

All sets had constant incremental-value structures, i.e., the products were aligned in a straight line. Across product class, compromise sets had (a) PRE structures of form [PRE(LoMed) = PRE(LoHi) < 1 | PRE(MedHi) < 1]; (b) absolute-value structures of form [ValueLo(0) > ValueMed(0) > ValueHi(0)]; (c) C_{Hi} option had the highest benefit and cost levels but the lowest absolute value in $\{A_{Lo}, B_{Med}, C_{Hi}\}$; and (d) B_{Lo} had the lowest benefit and cost levels but the highest absolute value in $\{B_{Lo}, C_{Med}, D_{Hi}\}$. Across product class, polarization sets had (a) PRE structures of form [PRE(LoMed) = PRE(LoHi) > 1 | PRE(MedHi) > 1]; (b) absolute-value structures of form [ValueLo(0) < ValueMed(0) < ValueHi(0)]; (c) C'_{Hi} option had the highest benefit, cost and absolute value in $\{A'_{Lo}, B'_{Med}, C'_{Hi}\}$; and (d) B'_{Lo} had the lowest benefit, cost and absolute value in $\{B'_{Lo}, C'_{Med}, D'_{Hi}\}$. Across PRE structures and set types, when B, B', C or C' was the intermediate brand, its benefit, cost and absolute value were intermediate also.

In comparison to their compromise counterparts {A,B,C,D}, polarization portable grills {A',B',C',D'} had equal cooking areas but had higher weights. Hence, although both types were located in the attractive region (benefit > cost), polarization grills had lower absolute values than polarization grills. However, polarization grills' constant pairwise incremental-value was higher than that of compromise grills.

In addition to having constant pairwise incremental-value, computer sets' benefit and price ranges were also kept constant across PRE-structure type. Each computer in the polarization sets {W',X',Y',Z'} had lower memory, higher cost, and, hence, lower value than its counterpart in the

compromise sets {W,X,Y,Z}. Computer polarization sets were located in the aversive region (benefit<cost) while computer compromise sets were located in the attractive region (benefit>cost).

Results are displayed in Table 3-6. According to the value-ranking hypothesis, opposite choice patterns should have been observed for polarization sets versus compromise sets. According to the extremeness aversion hypothesis, a product-class effect independent of PRE structure should have been observed: compromise in portable grill sets only and polarization in personal computer sets only. As Table 3-6 shows, none of these choice patterns was consistently obtained.

Contrary to the value-ranking hypothesis, the proportion of respondents choosing low, intermediate, or high absolute values is significantly different for the four grill sets ($\chi^2_{(6)} = 59.4$, $p < .001$) and the four computer sets ($\chi^2_{(6)} = 30.46$, $p < .001$). The choice pattern increased monotonically with absolute-value scale rank-order in polarization sets but not in compromise sets. Contrary to attribute-dependent extremeness aversion, the proportion of respondents choosing the low, intermediate, or high benefit option was significantly different for the four grill sets ($\chi^2_{(6)} = 23.0$, $p < .001$) and the four computer sets ($\chi^2_{(6)} = 15.0$, $p < .03$). Another implication of the extremeness aversion hypothesis was also not observed: a simple 2-way interaction of higher v. lower benefit option x product class for low-context sets. That is, symmetric extremeness aversion should have caused B_{Med} (B'_{Med}) to be preferred to C_{Hi} (C'_{Hi}) for grills while asymmetric extremeness aversion should have caused C_{Hi} (C'_{Hi}) to be preferred to B_{Med} (B'_{Med}) for computers.

In contrast, across product class the predicted polarization pattern of choice, [P(Hi|Lo,Med) > P(Med|Lo,Hi) > P(Lo|Med,Hi)], was obtained for sets with PRE structures of form [PRE(LoMed) = PRE(LoHi) > 1 | PRE(MedHi) > 1]. There were no significant differences in core-options' choice shares for either the low-context sets ($\chi^2_{(1)} = .48$, $p > .49$) or the high-context sets ($\chi^2_{(1)} = 0.004$, $p > .95$). As expected, higher-benefit, higher-value C was preferred to lower-benefit, lower-value B in both low-context sets [$\frac{P(C'_{Hi}|A'_{Lo}, B'_{Med})}{P(B'_{Med}|A'_{Lo}, C'_{Hi})} = 1.96$; $z = 3.13$, $p < .001$] and high-context sets [$\frac{P(C'_{Med}|B'_{Lo}, D'_{Hi})}{P(B'_{Lo}|C'_{Med}, D'_{Hi})} = 6.14$; $z = 6.82$, $p < .001$]. The change in the share-ratio across set-contexts was also significant ($t_{(124)} = 2.67$, $p < 0.01$).

The predicted compromise choice pattern, [P(Med|Lo,Hi) > P(Lo|Med,Hi) and P(Med|Lo,Hi) > P(Hi|Lo,Med)] also was obtained across product class for sets with PRE structures of form [PRE(LoMed) = PRE(LoHi) < 1 | PRE(MedHi) < 1]. There were no significant differences in core-options' choice shares for either the low-context sets ($\chi^2_{(1)} = .003$, $p > .95$) or the high-context sets ($\chi^2_{(1)} = 2.19$, $p > .13$). The preference for lower-benefit, higher-value B over higher-benefit, lower-value C approached significance in the low-context sets [$\frac{P(B_{Med}|A_{Lo}, C_{Hi})}{P(C_{Hi}|A_{Lo}, B_{Med})} = 1.39$; $z = 1.59$, $p < .06$] but it was not significant in the high-context sets [$\frac{P(B_{Lo}|C_{Med}, D_{Hi})}{P(C_{Med}|B_{Lo}, D_{Hi})} = .79$; $z = 1.03$, $p > .15$]. However, the change in this share-ratio was significant ($t_{(166)} = 1.84$, $p < 0.05$).

Recall Hollman and Lynch kept product class, attribute type and ranges, absolute-value structure along with incremental-value magnitude and structure equal for all the personal computer sets but varied the magnitude of options' absolute values such that polarization sets were located in the aversive region (benefit<cost) and compromise sets were located in the attractive region (benefit>cost). Consequently, the significant PRE structure effect within personal computers ($\chi^2_{(2)} = 8.27$, $p < .02$) also constituted a test of the region effect. The constant incremental value rate was interpreted more favorably in the aversive region than in the attractive region. As predicted, the attractiveness of the highest-benefit option was significantly greater ($z = 2.28$, $p < .02$) for the contributive-polarization sets located in the aversive region [P(Hi|Lo,Med) = .54] than for the conflictive-compromise sets located in the attractive region [P(Hi|Lo,Med) = .38]. In contrast, the lowest-benefit options were significantly less attractive ($z = 2.63$, $p < .01$) in attractive region sets [P(Lo|Med,Hi) = .12] than in aversive region sets [P(Lo|Med,Hi) = .26] while the intermediate option was equally ($z = .21$, $p > .58$) preferred in the attractive [P(Med|Lo,Hi) = .36] and aversive [P(Med|Lo,Hi) = .34] regions.

Hollman and Lynch argued that tenets of relative value theory and the proportional rate of exchange hypothesis provided a more comprehensive account of choice in trinary contexts as presently studied. To test the generality of the analyses and experimental results of Experiment 4, they undertook a meta-analysis of trinary choice studies conducted by authors listed in Table 3-4.

Meta-Analysis Of Trinary Choice Data

Table 3-7 shows a summary of 57 trinary choice sets across 17 product classes with a total of 3,226 participating respondents. The researchers listed in Table 3-4 used these sets to demonstrate effects such as compromise, polarization, attraction, detraction or enhancement. The inclusion criteria were the same as for the binary choice meta-analysis. Table 6 also shows the number of sets, the number of respondents, the mean absolute values and shares for low-benefit option A, intermediate-benefit option B, and high-benefit option C, as well as the mean magnitudes of the tree pairwise incremental-value rates and proportional rates of exchange per category.

Fifty-six percent (32) of the sets were located in the aversive region (i.e., ValueA(0) < 1). Of these, 68% involved quality-price [Q/Cost($)] tradeoffs. In contrast, 64% of the 22 sets located in the attractive region (i.e., ValueA(0) ≥ 1) required trading off quality versus other types of cost [Q/Cost(N-$)]). The sets were also classified according to their incremental-value type. Thirty-seven percent were classified as Constant because their options were in a straight line and their three pairwise incremental values were equal. The majority of these sets (95.2%) had absolute value structures that should have favored low-benefit option A according to the value-ranking hypothesis, [ValueA(0)>ValueB(0)>ValueC(0)]. The remaining sets (36) were classified as Variable because their options were not in a straight line and at least one of their three pairwise incremental values was different from the other two. Fifty-three percent of these sets also had absolute-value structures favoring A. Within the Variable incremental-value category, 64% of sets were further classified as Enhanced -- i.e., their incremental-value structure, [ValueB(A)≥ValueC(A)≥ValueC(B)], was supposed to favor intermediate option B. The remaining 13 sets were classified as Detracted -- their incremental-value structure [ValueB(A)≤ValueC(A)≤ValueC(B)] was supposed to disfavor B and favor A. Only 2 % of all sets had absolute-value structures wherein option C had the highest absolute value.

As in Experiment 4, there were two distinct PRE structures corresponding to the sets with constant incremental-value type: [PRE(AB)= PRE(AC); PRE(BC)<PRE(AC)] and [PRE(AB)=

PRE(AC); PRE(BC)≥PRE(AC)]. Three distinct PRE structures were observed in sets with variable incremental-value type: [PRE(AB)>PRE(AC); PRE(BC)<PRE(AC)], [PRE(AB)<PRE(AC); PRE(BC)<PRE(AC)], and [PRE(AB)<PRE(AC); PRE(BC)≥PRE(AC)]. Lastly, the sets were classified according to their level of PRE(MedHi) (<1 or ≥1).

Contrary to predictions derived under extremeness aversion, local tradeoff contrast, or value-ranking hypotheses , there were no significant effects of tradeoff type, incremental-value structure, nor of absolute-value structure after the relative-theory-derived factors' effects were partialled out.

In accord with Experiment 4's results, there was a significant effect of PRE structure ($F = 8.53$, $p < .001$), PRE structure x PRE(MedHi) type ($F = 4.24$, $p < .01$), and PRE structure x PRE(MedHi) type x Region ($F = 150.41$, $p < .001$).

To further test the effect of PRE structure and region, Hollman and Lynch calculated the Hi/Med relative-share-ratio, $\frac{P(Hi|Lo,Med)}{P(Med|Lo,Hi)}$, as a measure of the popularity of each set's high-benefit option relative to its intermediate-benefit option in the presence of a low-benefit option (see Tversky and Simonson, 1993, p.1188) across the trinary sets. They built a multiple regression model using the stepwise method weighted by the number of participants per set. For inclusion of an independent variable into the equation, the probability associated with its F test was set at PIN ≤ .05 while for exclusion, the probability associated with its F test was set at POUT ≥ .10. Dummy-coded indicator variables were Region (aversive v. attractive); Incremental-value type (constant v. variable), and Tradeoff type (Q/Cost($) v. Q/Cost(N-$). Continuous independent variables were PRE(AB), PRE(AC), PRE(BC), 3PREInt [PRE(AB)*PRE(AC)*PRE(BC)], ValueA(0), ValueB(0), ValueC(0), ValueB(A), ValueC(A), and ValueC(B).

The only variables that made it into the equation were PRE(BC), beta weight = .88, Region, beta weight = -.33, ValueA(0), beta weight = .22, and PRE(AC), beta weight = -.15 yielding a significant model ($F_{(4,52)} = 41.78$, $p < .0001$; $R^2 = .76$; adj-$R^2 = .74$):

$$(3.8)\ \left[\frac{P(Hi|Lo,Med)}{P(Med|Lo,Hi)}\right] = \alpha + \beta_1[\text{Region}] + \beta_2[\text{ValueA}(0)] + \beta_3[\text{PRE(BC)}] + \beta_4[\text{PRE(AC)}] + \varepsilon,$$

where $\alpha = .272$ ($t = 1.41$, $p = .16$), $\beta_1 = -.900$ ($t = -3.82$, $p < .001$), $\beta_2 = .012$ ($t = 2.53$, $p < .02$), $\beta_3 = 2.14$ ($t = 11.61$, $p < .0001$), and $\beta_4 = -.466$ ($t = -1.91$, $p < .07$).

Because the attractive region was coded as 1 and the aversive region was coded as 0, Equation 5 defines two regression lines with significantly different intercepts. The intercept for the attractive region is $\alpha + \beta_1(1) = -.628$ while the intercept for the aversive region is $\alpha + \beta_1(0) = \alpha = .272$.

The significant region parameter supported Hollman and Lynch's conjecture that the region effect increases the attractiveness of high-benefit C brands for sets in the aversive region and of intermediate-benefit B brands for sets in the attractive region. Another important implication of Equation 3.8 is that the slope of the two implied regression lines will differ also for sets located in the aversive regions from those located in the attractive region unless all three options are in a straight-line and on absolute-value vector equal to one (benefit = cost) -- i.e., [ValueA(0) = ValueB(0) = Value(C) = 1].

This model also supports other important points highlighted in previous analyses. For example, parameter β_2's positive sign indicates that in trinary choice as in binary choice, the attractiveness of a set's high-benefit option increases with increases in the value of the set's low-benefit option, ValueA(0). Across regions and PRE structures, Hollman and Lynch had conjectured that the likelihood that C is chosen over B should be monotonic with increases in PRE(BC). Parameter β_3's positive sign supports this hypothesis. They also had surmised that, all else equal, increasing the magnitude of PRE(BC) would have a stronger impact on the relative preference of C over B in sets having deficit limit rates [PRE(AC)<1] than in sets having surplus limit rates [PRE(AC)≥1]. The facts that parameter β_3 has a positive sign while parameter β_4 has a negative sign support this conjecture.

Summary

From a value-vector framework, the PRE(LoHi) measure implies: (a) Preference for a high-benefit option depends on both the incremental unique-rate, ValueHi(Lo), and on the initial common-rate, ValueLo(0); (b) The effect of a given level of ValueHi(Lo) depends on the level of ValueLo(0) and vice-versa. At a more general level, the proportional rate of exchange hypothesis suggests the following: (a) The valuation process is stable and consistent across contexts. (b) Decision-makers attend selectively to the relational properties of the evaluation set's structural relationships to determine product-preference rankings. These structural relationships depend on attributes, on the interrelationships of those attributes, as well as on higher order relationships of such attributes' interrelationships. (d) Information affects choice when it changes the relative value structure of the evaluation set. (e) Specific types of changes to the evaluation set's relative value structure elicit predictable choice responses. (f) And, product-choice devolves from the evaluation set's relative value structure, not from products' intrinsic attractiveness.

Table 3-1. Stimulus design and results for proportional rate of exchange Experiment 1.

	Option	Benefit % Coverage	Cost Premium	ValueC(0)-ValueA(0)	ValueA(0)	Value$C_{Hi}(A_{Lo})$	PRE$(A_{Lo}C_{Hi})$	Choice Share P(C|A)
PRE < 1*	A	70	$ 18		3.9			
	C	85	33	-1.31		1.00	0.25	0.54
n	46							
	A	70	88		0.80			
	C	85	163	-0.27		0.20	0.25	0.39
n	54							
Total	100							0.46
PRE > 1	A	70	140		0.50			
	C	85	155	0.05		1.00	2.00	0.89
n	53							
	A	70	700		0.10			
	C	85	775	0.01		0.20	2.00	0.90
n	51							
Total	104							0.89
Total	204							0.68

Source: Hollman and Lynch, 1997.

Note: * Main effect of PRE, 1.14, χ^2 (1) = 36.34, p < .01

Table 3-2 . Stimulus design and results for Proportional Rate of Exchange Experiment 2.

n	Option	Benefit Memory (K)	Cost Price ($)	ValueC(0)-ValueA(0)	ValueA(0)	ValueC$_{Hi}$(A$_{Lo}$)	PRE(A$_{Lo}$,C$_{Hi}$)	Choice Share P(C$_{Hi}$|A$_{Lo}$)
PRE ≤ 0.5								
	A	350	373		0.94			
22	C	450	1173	-0.55		0.13	0.13	0.05
	A	240	320		0.75			
19	C	340	1120	-0.45		0.13	0.17	0.05
	A	350	467		0.75			
19	C	450	1267	-0.39		0.13	0.17	0.05
	A	32	43		0.74			
42	C	132	843	-0.59		0.13	0.17	0.38
	A	240	427		0.56			
22	C	340	1227	-0.28		0.13	0.22	0.00
	A	350	1120		0.31			
18	C	450	1920	-0.08		0.13	0.40	0.17
142								0.15 [a]
0.5 < PRE < 1.0								
	A	32	171		0.19			
15	C	132	971	-0.05		0.13	0.67	0.53
	A	240	1280		0.19			
35	C	340	2080	-0.02		0.13	0.67	0.17
	A	350	1867		0.19			
16	C	450	2667	-0.02		0.13	0.67	0.19
66								0.26 [a, b]
1.0 < PRE ≤ 3.0								
	A	350	194		1.80			
16	C	450	244	0.04		2.00	1.11	0.56
	A	240	200		1.20			
18	C	340	250	0.16		2.00	1.67	0.89
	A	350	292		1.20			
18	C	450	342	0.12		2.00	1.67	0.61
	A	32	27		1.19			
18	C	132	77	0.53		2.00	1.69	0.94

Table 3-2--continued.

n	Option	Benefit Memory (K)	Cost Price ($)	ValueC(0)-ValueA(0)	ValueA(0)	ValueC$_{Hi}$(A$_{Lo}$)	PRE(A$_{Lo}$,C$_{Hi}$)	Choice Share P(C$_{Hi}$|A$_{Lo}$)
1.0 < PRE ≤ 3.0		(Continued)						
	A	240	218		1.10			
15	C	340	268	0.17		2.00	1.82	0.80
	A	32	512		0.06			
18	C	132	1312	0.04		0.13	2.00	0.83
	A	32	46		0.70			
16	C	132	96	0.68		2.00	2.88	0.88
119								0.79 [b, c]
3.0 < PRE								
	A	240	400		0.6			
18	C	340	450	0.16		2.00	3.33	0.94
	A	240	800		0.30			
18	C	340	850	0.10		2.00	6.67	0.94
	A	350	1167		0.30			
18	C	450	1217	0.07		2.00	6.67	0.89
	A	32	107		0.30			
18	C	132	157	0.54		2.00	6.69	1.00
	A	350	1750		0.20			
18	C	450	1800	0.05		2.00	10.00	0.83
	A	32	320		0.10			
18	C	132	370	0.26		2.00	20.00	0.94
108								0.93 [c]
435								0.54

Source: Hollman and Lynch, 1997

Note: [a] Proportions differed significantly, $Z^2 = 1.7, p < .05$.
[b] Proportions differed significantly, $Z^2 = 8.1, p < .01$.
[c] Proportions differed significantly, $Z^2 = 3.0, p < .01$.

Table 3-3 . Stimulus design and results for proportional rate of exchange Experiment 3.

n	Personal Computer [b]	Benefit Memory (K)	Cost Price ($)	ValueC(0)-ValueA(0)	ValueA(0)	$ValueC_{Hi}(A_{Lo})$	$PRE(A_{Lo}C_{Hi})$	Choice share $P(C_{Hi} \mid A_{Lo})$
PRE < 1 [a]								
	A	1024	2048		0.50			
9	C	1152	2816	-0.09		0.17	0.33	0.22
	A	1024	1365		0.75			
8	C	1152	1877	-0.14		0.25	0.33	0.00
	A	1024	683		1.50			
8	C	1152	939	-0.27		0.50	0.33	0.25
25								0.16
	Dental Insurance	% Coverage	Premium					
	A	65	433		0.15			
9	C	85	833	-0.05		0.05	0.33	0.22
	A	70	350		0.20			
7	C	80	500	-0.04		0.07	0.33	0.43
	A	70	233		0.30			
8	C	80	333	-0.06		0.10	0.33	0.50
24								0.38
	Tire	Warrantee-mi.	Price($)					
	A	60000	70		857			
8	C	70000	105	-190		286	0.33	0.25
	A	35000	29		1207			
12	C	45000	54	-374		400	0.33	0.50
	A	60000	28		2143			
8	C	65000	35	-286		714	0.33	0.50
28								0.43
77								0.32 *

Table 3-3--continued.

n	PRE = 1							
n	Personal Computer	Benefit Memory (K)	Cost Price ($)	ValueC(0)-ValueA(0)	ValueA(0)	ValueC$_{Hi}$(A$_{Lo}$)	PRE(A$_{Lo}$C$_{Hi}$)	Choice share P(C$_{Hi}$|A$_{Lo}$)
	A	640	3840		0.17			
8	C	740	4440	0.00		0.17	1.00	0.63
	A	512	2048		0.25			
9	C	640	2560	0.00		0.25	1.00	0.67
	A	640	1280		0.50			
8	C	740	1480	0.00		0.50	1.00	0.50
25								0.60
	Dental Insurance	% Coverage	Premium					
	A	70	1400		0.05			
8	C	85	1700	0.00		0.05	1.00	0.63
	A	70	1050		0.07			
9	C	75	1125	0.00		0.07	1.00	0.67
	A	65	650		0.10			
8	C	85	850	0.00		0.10	1.00	0.88
25								0.72
	Tire	Warrantee-mi.	Price					
	A	55000	193		285			
8	C	75000	263	0.20		286	1.00	0.75
	A	55000	138		399			
4	C	70000	175	1.45		405	1.02	1.00
	A	35000	49		714			
7	C	45000	63	0.00		714	1.00	0.86
19								0.84
69								0.71 *, ♣

Table 3-3--continued.

n	PRE > 1 Personal Computer	Benefit Memory (K)	Cost Price ($)	ValueC(0)-ValueA(0)	ValueA(0)	ValueC$_{Hi}$(A$_{Lo}$)	PRE(A$_{Lo}$C$_{Hi}$)	Choice share P(C$_{Hi}$|A$_{Lo}$)
	A	512	12288		0.04			
7	C	612	12888	0.01		0.17	4.00	0.71
	A	512	8192		0.06			
8	C	612	8592	0.01		0.25	4.00	0.75
	A	512	4096		0.13			
8	C	612	4296	0.02		0.50	4.00	0.63
23								0.70
	Dental Insurance	% Coverage	Premium					
	A	75	6000		0.01			
8	C	85	6200	0.001		0.05	4.00	1.00
	A	75	4500		0.02			
8	C	85	4650	0.002		0.07	4.00	1.00
	A	75	3000		0.03			
8	C	85	3100	0.002		0.10	4.00	1.00
24								1.00
	Tire	Warrantee-mi.	Price					
	A	35000	245		143			
8	C	40000	263	9.2		278	1.94	1.00
	A	30000	150		200			
8	C	35000	163	14.7		385	1.92	1.00
	A	75000	210		357			
10	C	85000	224	22.3		714	2.00	0.80
26								0.92
73								0.88 ♣
219								0.63

Source: Hollman and Lynch, 1997.

Note: [a] Main effect of PRE, χ^2 (1) = 45.5, p < .01. * Proportions differed significantly, p < .001. ♣ Proportions differed marginally, p < .10.
[b] Main effect of Product Class, χ^2 (1) = 14.5, p < .01.

Table 3-4. Compendium of 49 binary choice studies shown summarized by product class (19) and researcher (7) used in a meta-analytic test of the proportional rate of exchange hypothesis. *

RESEARCHER	PRODUCT CLASS	BENEFIT	COST
Heath & Chatterjee, 1995	Beer	Quality rating (0-100)	Price/6-pack
Heath et al., 1995	Microwave oven	Power (watts)	Price/item
	Microwave oven	Quality rating (0-1.00)	Price/item
	Light bulbs	Estimated life (hours)	Price/item
	Orange juice	Quality rating (0-1.00)	Price/item
Huber & Puto, 1983	Beer	Quality rating (0-100)	Price/6-pack
	Restaurant	Quality rating (0-5 stars)	Driving time in minutes
	Calculator battery	Estimated life-hours	Price/2
	Film	Color fidelity rating (0-100)	Developing time in minutes
	Beer	Quality rating(0-100)	Price/6-pack
	TV set	Reliability (average years for breakdown)	Distortion (% off normal)
Prelec, Wernerfelt, & Zettelmeyer, 1995	Air conditioner	Operating noise rating (0-10)	Price/item
	Binoculars	Magnifying power (# times > normal)	Price/item
	Auto-focus camera	Number of features	Price/item
	Coffee maker	Quality rating (0-100)	Price/item
	Rain boots	Durability rating (0-100)	Price/item
	Vacuum cleaners	Suction power	Price/item
	VCR	Durability rating (0-100)	Price/item
Ratneshwar, Shocker, & Stewart, 1987	Orange juice	Quality rating (0-100)	Price/64 oz.
Simonson, 1989	Calculator battery	Estimated life (hours)	Probability of corrosion (0-100%)
	Beer	Quality rating (0-100)	Price/6-pack
Simonson & Tversky, 1992	Unleaded gas	Octane rating (0-100)	Price/gallon
	Personal computer	Memory (K-units)	Price/item
	Tires	Warrantee miles (1,000's usage-miles guaranteed)	Price/tire
	Dental Insurance	Per cent insurance coverage	Annual premium
	Binoculars	Magnifying power (# times > normal)	Price/item

Source: Hollman and Lynch, 1997.
Note: * A total of 4,064 respondents participated.

Table 3-5. Results of meta-analysis incorporating studies from Table 3-4 and from Experiments 1, 2, and 3 for a total of 102 binary choice sets of form {A,C} across 19 product classes. Preference for the more expensive C brand is shown as a function of the Proportional Rate of Exchange level and of Region.

		PRE < 1	PRE ≥ 1	TOTAL
Aversive Region[1]	P(C|A)[3]	.39[a, b]	.73[a, c]	.52[a, d]
ValueA(0) < 1	n	1867	1257	3124
	# of Sets	34	32	66
Attractive Region[2]	P(C|A)	.51[b]	.78[a, c]	.56[a, d]
ValueA(0) > 1	n	1469	339	1808
	# of Sets	23	13	36
Meta-Analysis	P(C|A)	.44[a, e]	.74[a, e]	.54[a]
Total	n	3336	1596	4932
	# of Sets	57	45	102

Source: Hollman and Lynch, 1977.
Note: [1] Raw magnitudes of costs exceed those of benefits, Benefit/Cost < 1.
[2] Raw magnitudes of benefits exceed those of cost, Benefit/Cost > 1.
[3] Proportion selecting the more expensive, higher benefit option C from choice set {A,C}.
[a] Proportions differed significantly from .5, $p < .01$.
[b] Proportions differed significantly from each other, $z = 10.01$, $p < .01$.
[c] Proportions differed marginally from each other, $z = 1.93$, $p < .06$.
[d] Proportions differed significantly from each other, $z = 2.46$, $p < .05$.
[e] Proportions differed significantly from each other, $z = 21.34$, $p < .01$.

Table 3-6. Results of Experiment 4 showing the choice shares obtained per option per set-context within product class.

Product Class: Portable Grill

Set Type: "Compromise"				
Set-Context	Value Rank:	High	Medium	Low
Low: {A,B,C}	Brand:	A	B	C
n = 77	Choice Shares:	.312	.403	.285
Set-Context				
High: {B,C,D}	Value Rank:	High	Medium	Low
	Brand:	B	C	D
n = 70	Choice Shares:	.271	.443	.286

Table 3-6. – continued

Product Class: Portable Grill

Set Type: "Polarization"				
Set-Context	Value Rank:	Low	Medium	High
Low: {A',B',C'}	Brand:	A'	B'	C'
n = 48	Choice Shares:	.167	.250	.583
Set-Context				
High: {B',C',D'}	Value Rank:	Low	Medium	High
	Brand:	B'	C'	D'
n = 46	Choice Shares:	.065	.392	.543

Product Class: Personal Computer

Set Type: "Compromise"				
Set-Context	Value Rank:	High	Medium	Low
Low: {W,X,Y}	Brand:	W	X	Y
n = 48	Choice Shares:	.208	.458	.334
Set-Context				
High: {X,Y,Z}	Value Rank:	High	Medium	Low
	Brand:	X	Y	Z
n = 47	Choice Shares:	.319	.255	.426
Set Type: "Polarization"				
Set-Context	Value Rank:	Low	Medium	High
Low: {W',X',Y'}	Brand:	W'	X'	Y'
n = 52	Choice Shares:	.173	.308	.519
Set-Context				
High: {X',Y',Z'}	Value Rank:	Low	Medium	High
	Brand:	X'	Y'	Z'
n = 50	Choice Shares:	.060	.380	.560

Source: Hollman and Lynch, 1997.
Note: The proportion of respondents choosing low, medium, or high ranked values is significantly different for the four portable grill sets ($\chi^2_{(6)} = 59.4$, $p < .0001$) and the four personal computer sets ($\chi^2_{(6)} = 30.46$, $p < .0001$). Similarly, the proportion of respondents choosing low, medium, or high benefit options is significantly different for the portable grill sets ($\chi^2_{(6)} = 23.0$, $p < .001$) and the personal computer sets ($\chi^2_{(6)} = 15.0$, $p < .001$).

Table 3-7. Meta-analysis of 57 trinary choice sets across 17 product classes used by researchers listed in Table 3-4 to demonstrate compromise, polarization, attraction, detraction, or enhancement effects.

Aversive Region: Benefit < Cost

Incremental Value Type	PRE Structure	PRE (BC) Type	Tradeoff Type	# of Sets	N	Option Shares		Means: Absolute Value		Means: Incremental Value		Means: Proportional Rate of Exchange	
Constant	(AB)=(AC)		Q/Cost($)	12	1007	A	.23	A(0)	.28	B(A)	.13	(AB)	.46
	(BC)>(AC)	<1				B	.38	B(0)	.23	C(A)	.13	(AC)	.46
						C	.39	C(0)	.21	C(B)	.13	(BC)	.54
			Q/Cost(N-$)	1	21	A	.24	A(0)	.21	B(A)	.08	(AB)	.39
						B	.43	B(0)	.15	C(A)	.08	(AC)	.39
						C	.33	C(0)	.14	C(B)	.08	(BC)	.54
	(BC)<(AC)	≥1	Q/Cost($)	1	41	A	.17	A(0)	.35	B(A)	.42	(AB)	1.19
						B	.27	B(0)	.38	C(A)	.42	(AC)	1.19
						C	.56	C(0)	.39	C(B)	.42	(BC)	1.11
Variable	(AB)>(AC)		Q/Cost($)	8	522	A	.17	A(0)	.25	B(A)	.29	(AB)	1.09
	(BC)<(AC)	<1				B	.49	B(0)	.26	C(A)	.20	(AC)	.69
						C	.34	C(0)	.22	C(B)	.15	(BC)	.48
			Q/Cost(N-$)	3	62	A	.03	A(0)	.19	B(A)	.25	(AB)	1.60
						B	.57	B(0)	.19	C(A)	.11	(AC)	.63
						C	.40	C(0)	.14	C(B)	.06	(BC)	.32
		≥1	Q/Cost($)	1	74	A	.04	A(0)	.05	B(A)	.10	(AB)	2.00
						B	.64	B(0)	.06	C(A)	.08	(AC)	1.67
						C	.32	C(0)	.07	C(B)	.07	(BC)	1.20
	(AB)<(AC)		Q/Cost($)	6	319	A	.31	A(0)	.47	B(A)	.27	(AB)	.62
	(BC)>(AC)	≥1				B	.16	B(0)	.44	C(A)	.43	(AC)	.93
						C	.53	C(0)	.46	C(B)	.81	(BC)	1.82
			Region Total	32	2046								

Attractive Region: Benefit ≥ Cost

Incremental Value Type	PRE Structure	PRE (BC) Type	Tradeoff Type	# of Sets	N	Option Shares		Means: Absolute Value		Means: Incremental Value		Means: Proportional Rate of Exchange	
Constant	(AB)=(AC)		Q/Cost($)	1	74	A	.15	A(0)	1.00	B(A)	.20	(AB)	.20
	(BC)>(AC)	<1				B	.63	B(0)	.60	C(A)	.20	(AC)	.20
						C	.22	C(0)	.47	C(B)	.20	(BC)	.33
			Q/Cost(N-$)	6	590	A	.24	A(0)	19.59	B(A)	12.00	(AB)	.66
						B	.44	B(0)	16.71	C(A)	12.00	(AC)	.66
						C	.32	C(0)	15.49	C(B)	12.00	(BC)	.76
Variable	(AB)>(AC)		Q/Cost($)	5	166	A	.14	A(0)	39.77	B(A)	83.57	(AB)	3.15
	(BC)<(AC)	<1				B	.60	B(0)	43.11	C(A)	32.74	(AC)	1.15
						C	.26	C(0)	39.14	C(B)	21.62	(BC)	.59
			Q/Cost(N-$)	5	108	A	.16	A(0)	27.41	B(A)	21.73	(AB)	1.80
						B	.51	B(0)	15.18	C(A)	11.56	(AC)	.92
						C	.33	C(0)	12.42	C(B)	7.40	(BC)	.51
		≥1	Q/Cost($)	1	44	A	.02	A(0)	12.00	B(A)	80.00	(AB)	6.67
						B	.59	B(0)	18.18	C(A)	29.63	(AC)	2.47
						C	.37	C(0)	18.18	C(B)	18.18	(BC)	1.00
	(AB)<(AC)		Q/Cost($)	4	137	A	.26	A(0)	39.97	B(A)	22.81	(AB)	.77
	(BC)<(AC)	<1				B	.53	B(0)	37.74	C(A)	19.99	(AC)	.60
						C	.21	C(0)	35.06	C(B)	17.07	(BC)	.77
			Q/Cost(N-$)	3	61	A	.05	A(0)	123.33	B(A)	14.00	(AB)	.10
	BC)>(AC)	<1				B	.38	B(0)	60.67	C(A)	3.08	(AC)	.02
						C	.57	C(0)	15.41	C(B)	1.50	(BC)	.03

Table 3-7. – continued.

Region Total	25	1180

# of Sets	N	Option Shares		Meta-Analysis Summary Means: Absolute Value		Incremental Value		Proportional Rate of Exchange	
57	3226	A	.21	A(0)	17.64	B(A)	14.37	(AB)	1.14
		B	.43	B(0)	13.19	C(A)	7.35	(AC)	.72
		C	.37	C(0)	9.89	C(B)	5.55	(BC)	.67

Source: Hollman and Lynch, 1997.

CHAPTER 4
EQUIVALENCE OF DECISION-MAKING PROCESS ACROSS CHOICE CONTEXTS: FREE-CHOICE VERSUS FORCED-CHOICE

Overview

If a strong bias for the status quo is the modal buyer behavior as Samuelson and Zeckhauser (1988) and others conclude, what entices consumers to actively participate in market-place transactions? In this chapter, I show that basic concepts derived from forced-choice research can help to answer this important question.

According to the proportional rate of exchange hypothesis, product-choice results from the product's evaluation set's relative value structure and not from a product's intrinsic attractiveness. All support for this conjecture given in Chapter 3 relied on forced-choice sets with directly comparable alternatives having important attributes in common. Does the same decision process prevail when the choice is between dissimilar actions—purchase A or retain status quo—rather than between two similar actions—purchase product A or C?

In free-choice sets of form {defer,A}, decision-makers must choose between two seemingly different types of responses. For buying situations, it is instructive to think of these two responses in terms of the taking of benefit positions. For example, opting to acquire product A suggests the active "taking" of unique benefit-position A, that, as is normally required for activity initiation, necessitates the expenditure of reserves, i.e., costs; I refer to this choice as the proactive choice response. Opting to defer suggests a preference for maintaining a current benefit-position where there is none of A's unique benefits thereby forestalling expenditures above those required to maintain the chosen steady state or status quo; I refer to this choice as the inertial choice response.

Forced-choice sets such as {A,C} preclude the inertial response. Forced-choice sets require instead that decision-makers choose between two available and comparable proactive responses given their attendant costs: benefit-position-A or benefit-position-C. Thus, a set of form {A,C} as a decision context is, in reality, a <u>binary decision context</u> that is also a <u>forced-product-choice</u> context, i.e., it represents a case of high product-decision urgency.

Because free-choice set {defer,A } requires choosing between two alternatives, it is as much a binary decision context as is set {A,C}. However, because set {defer,A} does not require the proactive response, decision-makers do not feel compelled to accept the product offering. That is, their level of product-decision-urgency is lower than in forced-product-choice contexts. Hence, these sets are binary decision-contexts that are also <u>free-product-choice</u> contexts. The same arguments readily apply to trinary decision-contexts such as {A,B,C} and {defer,A,C}.

Relative value theory asserts the decision-making process is the same in forced-product-choice sets and free-product-choice sets. The difference in observed choice patterns across these two contexts is due to the fact that forced-choice sets are always implicit sets: the inertial response is always a known alternative, but, it is not an available response option. As a member of the evaluation set, the defer position should have a predictable impact on the attractiveness of A relative to C even when deferring product-choice is not a viable option.

Relative value theory asserts product-choice results from a product's evaluation set's relative value structure and not from its intrinsic attractiveness and the decision-making process is the same across free- and forced-choice sets. Hence, controlling the relative value structure of free-choice sets should have a predictable impact on product-choice. Furthermore, controlling the relative value structure of competitor brands across free-choice and forced-choice formats should elicit comparable product-choice response patterns. These issues are the focus of the remainder of this chapter.

Relative Value Analysis of Free-Choice

Restating the WTP Concept in Relative Value Terms

In relative value theory, the ultimate referent state is one where benefits and costs are in balance. This concept is implicit to the region effect that was shown to significantly impact product preference in forced-product-choice sets. The use of such a standard makes sense at an intuitive level in cases where a product is evaluated without taking into consideration any other information such as a similar product's benefit/cost levels.

For any one transaction, consumers may enjoy a consumer surplus, may break even, or may incur consumer deficits at times of high-decision urgency. In the long run, however, it is reasonable to assume that consumers expect to at least break even, i.e., aggregate benefits should tend to equal aggregate cost. Given this assumption, the expected long-run trend in relative value would be $PRE_{\infty} = 1$.

The above conclusion is concordant with the willingness-to-pay concept discussed in Chapter 2 (see Equation 2.2). Resources are finite, thus consumers are willing to incur incremental costs to acquire product A only when $WTP(A) = [(UtilityA/priceA) - 1] \geq 0$. The hypothetical reference vector to set the WTP scale in choice models is routinely defined as $Value_0 = 1$ (e.g., Kreps, 1990; Luenberger, 1992; Rosen, 1974). In addition, behavioral theorists such as Tversky and Kahneman (also see Kahneman, 1992; Kahneman et al., 1990), have expressed agreement with the standard theory of choice's assertion that the purchase decision is a choice between a current product choice versus other products that could be purchased instead. Also, Lancaster (1966) viewed the consumer as a "seeker" of benefits and not of products. This way of conceptualizing the consumer suggests that purchase decisions entail the assessment of the relative value of benefit-positions in one or more product classes. At this level of abstraction, forced-product choice and free-product-choice have the same goal—take a benefit-position that maximizes relative value.

Relative value theory views decision-makers as "users" of the decision-context's relative value structure to guide their product-choices. Imagining decision-makers as seekers of benefit positions that use relative value information to determine the best available benefit position to take suggests a restatement of the WTP concept. (a) Because resources are finite, the purchase decision is a choice between taking a benefit position in the product class currently under consideration versus taking a benefit position in other product classes instead. (b) Consumers are willing to incur incremental costs to acquire benefit-position A when its incremental benefit-units' relative value exceeds or equal the consumers' expected trend in relative value. All else equal, (a) and (b) imply the proactive response will not be chosen unless the evaluation set's relative value structure indicates a non-negative change in relative value for at least one benefit-interval in the choice set.

Partitioning of the Total Benefit Interval in Binary Free-Product-Choice

The expected value of the inertial response: ValueLo(0)

For a current decision event, the inertial choice represents a preference for the "balanced" position of no-new-benefit-acquired, no-new-cost-incurred. Thus, irrespective of whether it is an explicitly available choice option as in free-product-choice, or it is precluded from choice as in forced-product-choice, the defer position must always hold the lowest benefit position in every evaluation set. In terms of relative value theory's nomenclature, the lowest benefit position rate is denoted as ValueLo(0). Given the assumption that consumers expect aggregate benefits to equal aggregate costs in the long run, the expected value rate for the defer position is $Value_0 = 1$. Therefore, in free-product-choice sets ValueLo(0) = ValueDefer = $Value_0 = 1$.

The expected value of the proactive response: PRE(LoHi)

With this insight in mind, let us analyze choice set {A2,C2}, shown in Figure 3-3, Chapter 3, as implicit forced-product-choice set {[defer],A2,C2}. Given the information provided, every one of the computers shows a consumer deficit, i.e., Value < 1. The overall trend in decreasing

value is easy to see graphically since all product value-vectors are to the right of $Value_0 = 1$. Thus, all computers are in the aversive region.

Moreover, ValueDefer represents the "common" rate and the low benefit-sector rate because "defer" is the lowest benefit position, ValueLo(0)—i.e., ValueDefer = ValueLo(0) = $Value_0 = 1$. Recall ValueLo(0) is the rate of the fallback benefit-position that consumers accept only if "there is nothing better" in the high benefit-sector.

Suppose C2's value were to be assessed in isolation, yielding set $\{defer, C2_{Hi}\}$. Because it is the only known brand, C2 is the high-benefit brand by definition. Hence, interval 0→C2 is the set's total benefit-interval. As a result, its rate, ValueHi(Lo), is both the high-benefit-sector rate and the "unique" incremental rate. That is, in this example, ValueHi(Lo) = ValueC2(0) < 1.

Contrasting ValueHi(Lo) to ValueLo(0) yields proportional rate of exchange PRE(LoHi), represented in this set by PRE(deferC2):

(4.1) $$\text{PRE(deferC2)} = \frac{ValueC2(0)}{Value_0} = \frac{.047K/\$}{1K/\$} = .047.$$

Consequently, the PRE-structure for hypothetical set $\{defer, C2_{Hi}\}$ is $[PRE_\infty = 1 < \text{PRE(deferC2)} = .047]$, indicating a depreciation rate of -.953/cost-unit (=.047 - 1) for C2's incremental benefit-units relative to our expectation of no change in the relative value trend, $PRE_\infty = 1$.

Our decision rule is that the proactive response (purchase) is attractive when the evaluation set's relative value structure indicates a non-negative change in relative value for at least one of the available incremental benefit-intervals. C2's relative value in {defer,C2} does not reach this threshold. Thus, it is probable that C2 would not appear attractive if considered in isolation given the paucity of the information at hand.

Partitioning of the Total Benefit Interval in Trinary Free-Product-Choice

The within-set trend in relative value: PRE(LoHi)

What should we expect to happen if A2 is introduced into {defer,C2}? The new set is $\{defer_{Lo}, A2_{Med}, C2_{Hi}\}$. Both computers show consumer deficits; neither should appear to be

attractive in isolation. However, considering A2 and C2 simultaneously sets up a trinary evaluation set that may be partitioned in the same manner as shown in Chapter 3, Figure 3-5.

Note that option A2 is now an "intermediate-benefit" option. Therefore, along with C2, it is a member of the high benefit-sector to which consumers aspire. The low benefit-sector rate continues to be ValueLo(0) = Value0; the defer→C2 high benefit-sector rate is still ValueC(0). Contrasting these two rates yields the within-set trend: PRE(LoHi) = PRE(deferC2) = .047. This trend engenders the expectation that incremental benefit-units in this product class depreciate at a rate of -.953/cost-unit, thus creating a negative evaluative context.

Because our decision-makers are benefit-seekers with at least an intermediate level of product-decision urgency, they attempt to differentiate the best relative brand in the high benefit-sector. A trinary evaluation set allows the construction of two proportional rates of exchange that partition PRE(LoHi) and aid the differentiation process.

They construct PRE(LoMed) for the defer→A2 intermediate common-interval and PRE(MedHi) for the A2→C2 unique benefit-interval--yielding PRE(deferA2) and PRE(A2C2), respectively. The resultant PRE-structure is [PRE(LoMed) = .042 < PRE(LoHi) = .045 < 1| PRE(MedHi) = 4 > 1]. Of course, this is the typical "polarization" PRE structural configuration that elicits a strong preference for the high-benefit brand in trinary forced-product-choice as demonstrated in Chapter 3. Let us see why.

Contrary to the negative expectation engendered by the within-set trend, PRE(LoHi), the unique benefit-units seem to appreciate in relative value at the surprising rate of 3/cost-unit. In contrast, the intermediate common-benefit units' rate of relative value depreciation is even worse than expected [-.958 vs. -.953]. This comparison indicates relative value is increasing at an accelerated rate in the coveted A2→C2 high benefit-sector, thus, greatly enhancing the attractiveness of taking benefit position C2.

Note in Figure 3-3 that C1's value rate is greater than C2's value rate, i.e., ValueC1(0) > ValueC2(0). Yet, a higher proportion chooses C2 in its context than C1 in its context. A relative value analysis of hypothetical {defer,A1,C1} as we just did for {defer,A2,C2}, explains the

observed differential attractiveness of the two high-benefit brands. Set {defer,A1,C1}'s trinary evaluation structure, [$1 > PRE(LoMed) = .5 > PRE(LoHi) = .41 | PRE(MedHi) = .3 < 1$] is an "attraction" PRE structural configuration that elicits a preference for the intermediate benefit-position. Whereas C1's unique benefit-units depreciate at a worse rate than expected, -.70 vs. -.59, A1's incremental benefit-units depreciate at a lower rate than expected, .-.50 vs. -.59. The contrasting process enhances A1' relative attractiveness.

Proposition of Theory Tests in a Buying Context

Overview

The above relative value analysis of hypothetical free-product-choice sets suggests a way to test (a) whether the decision process is constant across free-product-choice and forced-product-choice and (b) whether, rather than reflecting a product-based preference structure, product-choice is a manifestation of a relation-based preference structure.

Assume related products A, B, and C, are similarly attractive to a significant majority, namely, $1.0 > P(A|defer) \approx P(B|defer) \approx P(C|defer) \geq .5$. Then, A, B, C, and others like them are all members of the acceptable option set. As long as the likelihood that any two brands are chosen when available is within the range $1.0 \geq P(product|defer) \geq .5$, the standard model of choice based on product-preference holds.

That is, the specific aggregate competitive relationship among the brands cannot falsify this model when all brands are at least acceptable to a significant majority. Thus, set-composition-dependent fluctuations in the preference of any of the choice options above cannot rule out a product-preference model. However, this also means that the standard model is not powerful enough to predict inter-brand competition; it can only be used to create explanatory models of past behavior. But, as I proposed in Chapter 2, the use of brands shown to be rejected by a significant

majority provides the means to test both models of choice: product-based preference or relation-based preference.

Experimental Setting

Finite set of products: Alow, Ahi, Clow, Chi

Consider personal computers A$low ($1199,4megs), A$hi ($1497,4megs), C$low ($1995,8megs), and C$hi($2995,8megs)[1] depicted in Figure 4-1. These four products will be used for all theory tests to be reported in this and the next two chapters.

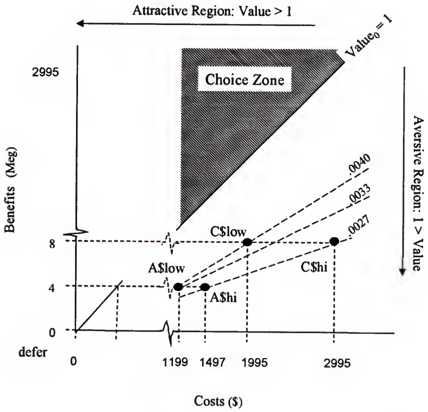


Figure 4.1. Position of four brands of personal computers according to the magnitude of their price, memory and absolute value (= megs/price) within Aversive Region where Value < 1.

[1] These brands were representative of similarly configured computers selling in the general vicinity of this university during the time the studies reported here were conducted.

Note that benefit level is designated by letters A and C. An "A" computer has 4 megs of RAM while a "C" computer has 8 megs of RAM. Within memory level, price level is identified as either $low or $hi. Consequently, computers C$low and C$hi have equal memory levels (8 megs) but C$low's price is lower than C$hi's price; similarly, A$low and A$hi have equal memory levels but A$low's price is lower than A$hi's price. In accord with their higher memory levels, the prices for both C$low and C$hi are higher than for either A$low or A$hi.

As shown in Figure 4-1, each computer is located in the aversive region: the absolute-value rate for each computer is less than one. While A$hi and C$hi are located in the same absolute value vector, ValueA$hi(0) = ValueC$hi(0) = .0027, the other two computers are located on slightly higher value vectors: ValueA$low(0) = .0033 and ValueC$low = .0040.

<u>Manipulation of product-decision urgency within buying condition</u>

In all conditions, respondents read a <u>context-paragraph</u> designed to induce one of two levels of product-decision urgency: Intermediate--free-product-choice condition--or High--forced-product-choice condition. The basic text of the context-paragraph was similar across free- and forced-product-choice conditions with the exception of the sentence in bold type as noted in Table 4-1.

The context-paragraph differed across binary and trinary free-product-choice sets as shown within the brackets, [...]. These differences were strictly intended to accommodate language requirements due to changing from a singular product to a pair of products and will not be mentioned further.

<u>Manipulation of the evaluation sets</u>

<u>Forced-product-choice condition</u>. Respondents were given one of two forced-product sets: {Alow,Chi} or {Ahi,Chi}. Thus, there was a known and available competitor for each brand.

<u>Free-product-choice condition</u>. Respondents were given one of two types of choice sets to consider: (a) binary choice sets of form {defer,Computer$_k$ }, where k represented one of the

computers depicted in Figure 4-1; (b) trinary choice sets of form {defer, A_m, C_m}, where m represented $low or $hi.

Table 4-1. Buying condition context-paragraphs used to induce one of two levels of product-decision urgency.

High product-decision urgency: Forced-product-choice condition.

You have decided to buy a computer because you need it for your work. Below there are two items. Assume that you have been able to find these two personal computer brands. This information has allowed you to narrow your choice set to these two brands. The computers differ from others you looked at only in the amount of RAM memory and price as described below. **Now, you must decide between these two computers at the price stated.** Please indicate your choice in the space provided below the description of the personal computers.

Intermediate product-decision urgency: Free-product-choice condition.

You have decided to buy a computer because you need it for your work. Below there are [one/two] item[/s]. Assume that you have been able to find [this/these two] personal computer brand[/s]. This information has allowed you to narrow your choice set to [this/these] [one/two] brand[/s]. The computer[/s]differ[s/] from others you looked at only in the amount of RAM memory and price as described below. **You will have to make a choice on whether to buy [the/one of these] computer[/s] at the price stated.** Please indicate your choice in the space provided below the description of the personal computer[/s].

The four computer brands were not fully crossed. Figure 4-2 shows a schematic diagram of the tests to be reported in this chapter using computers Alow, Clow, or C$hi. Tests using computers A$hi and C$hi will be reported in Chapter 6.

All trinary choice sets were explicit, i.e., their evaluation sets were expected to be the same as the choice set. Thus, just as in the forced-choice sets, there was a known and available competitor for each brand in the set: {defer,Alow,Clow}, {defer,Alow,Chi}, or {defer,Ahi,Chi}. This was not the case for the binary choice sets. There were two sub-conditions: (a) Explicit $\{S\} = \{E\}$ and Implicit $\{S\} \neq \{E\}$

The four computer brands were not fully crossed. Figure 4-2 shows a schematic diagram of the tests to be reported in this chapter using computers Alow, Clow, or C$hi. Tests using computers A$hi and C$hi will be reported in Chapter 6.

All trinary choice sets were explicit, i.e., their evaluation sets were expected to be the same as the choice set. Thus, just as in the forced-choice sets, there was a known and available competitor for each brand in the set: {defer,Alow,Clow}, {defer,Alow,Chi}, or {defer,Ahi,Chi}. This was not the case for the binary choice sets. There were two sub-conditions: (a) Explicit {S} = {E} and Implicit {S} ≠ {E}.

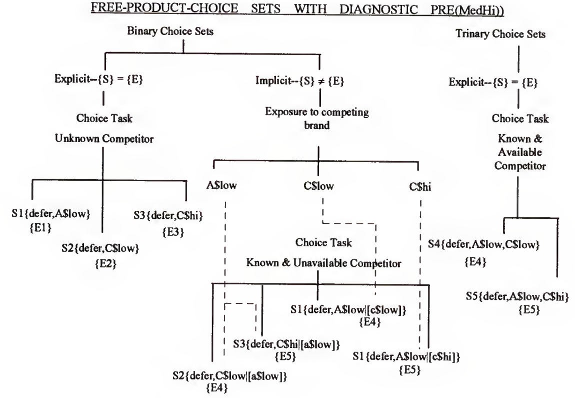


Figure 4-2. Design of the composition of choice {S} and evaluation {E} sets within the free-product-choice condition. Table 4-2 shows the specific structure for evaluation sets {E1} to {E5}.

In sub-condition Explicit {S} = {E}, choice sets {S1}, {S2}, and {S3} and their corresponding evaluation sets,{E1}, {E2}, and {E3}, were equal and of form {defer,Computer$_k$}.

As a result, each computer had to be assessed in isolation, all other competitor brands were unknown. The specific structure of each evaluation set is shown in Table 4-2.

Table 4-2. Evaluation sets' within-set relative value structure for buying choice sets shown in Figure 4-2.

<table>
<tr><th>Evaluation Set</th><th>PRE-Structural Configuration</th></tr>
<tr><td>Binary Explicit Sets</td><td></td></tr>
<tr><td>E1{defer,A$low}</td><td>[$PRE_{\infty}$=1>PRE(LoHi)]=[$PRE_{\infty}$=1>PRE(deferA$low)=.0033]</td></tr>
<tr><td>E2{defer,C$low}</td><td>[$PRE_{\infty}$=1>PRE(LoHi)]=[$PRE_{\infty}$=1>PRE(deferC$low)=.0040]</td></tr>
<tr><td>E3{defer,C$hi}</td><td>[$PRE_{\infty}$=1>PRE(LoHi)]=[$PRE_{\infty}$=1>PRE(defer C$hi)=.0027]</td></tr>
<tr><td>Binary Implicit Sets
Trinary Explicit Sets</td><td></td></tr>
<tr><td>E4{defer,Alow,Clow }</td><td>Polarization Structure: [PRE(LoMed)<PRE(LoHi)<1|PRE(MedHi)>1]
[PRE(deferA$low)=.0033<PRE(deferC$low)=.0040<1|PRE(A$lowC$low)=1.51>1]</td></tr>
<tr><td>E5{defer,Alow,Chi }</td><td>Attraction Structure: [1>PRE(LoMed)>PRE(LoHi)|PRE(MedHi)<1]
[1>PRE(deferA$low)=.0033>PRE(deferC$hi)=.0027|PRE(A$lowC$low)=.67<1]</td></tr>
</table>

In sub-condition Implicit {S} ≠ {E}, the binary choice sets were the same as in the Explicit sub-condition, {S1}, {S2}, and {S3}. However, their evaluation sets were trinary in form. By completing an unrelated selling task prior to the choice task, respondents learned about the existence of one other comparable competitor computer brand.

Respondents choosing from S2{defer,C$low} or S3{defer,C$hi} had been previously exposed to A$low. Thus, their evaluation sets were E4{defer,[a$low],C$low} and E5{defer,[a$low],C$hi}, respectively. Respondents choosing from S1{defer,A$low} had been previously exposed to either computer C$low or computer C$hi. Their evaluations sets were either E4{defer,A$low,[c$low]} or E5{defer,A$low,[c$hi]}. Hence, there was a known but unavailable competitor for each available brand.

<u>Manipulation of the within-set relative value structure: Construction of the PRE-structural configuration</u>

In all conditions, the evaluation sets' PRE(LoHi)'s were calculated using Equation 4.1 and were diagnostic: PRE≠1. In addition, as shown in Table 4-2, all PRE(LoMed)'s and PRE(MedHi)'s, were diagnostic as well: PRE≠1.

<u>Explicit binary sets</u>. Each PRE(LoHi) indicated similar magnitudes of decreasing relative value: PRE(deferA$low) = .0033, PRE(deferC$low) = .0040, and PRE(deferC$hi) = .0027. In all cases, the evaluation and choice sets coincided: S1{defer,A$low} = E1{defer,A$low}; S2{defer,C$low} = E2{defer,C$low}; and, S3{defer,C$hi} = E3{defer,C$hi}. Refer to Table 4-2.

<u>Implicit binary sets</u>. As shown in Figure 4-2, the evaluation sets within the Free-Product-Choice Implicit condition were varied such that respondents' evaluation sets were either {E4} or {E5}, see Table 4-2. Evaluation set E4{defer,Alow,Clow} has a "polarization" PRE-structural configuration designed to elicit preference for the highest benefit brand known: [(PRE(LoMed).0033 < (PRE(LoHi) = .0040) < 1| (PRE(MedHi) = 1.51 > 1]. Evaluation set E5{defer,Alow,Chi} has an "attraction" PRE-structural configuration designed to elicit a preference for the intermediate-benefit brand: [1 > PRE(LoMed) = .0033 > PRE(LoHi) = .0027| PRE(MedHi) = .67 < 1].

Respondents choosing from S1{defer,A$low} had obtained knowledge of either C$low--yielding evaluation set E4{defer,A$low,[c$low]}--or C$hi--yielding evaluation set E5{defer,A$low,[c$hi]}. Respondents choosing from S2{defer,C$low} or S3{defer,C$hi} had obtained knowledge of A$low. The evaluation set for those choosing from S2{defer,C$low} was E4{defer,[a$low],C$low}. The evaluation set for those choosing from S3{defer,C$hi} was E5{defer,[a$low],C$hi}.

For the tests to be reported in this chapter, there was one Implicit forced-product-choice set, S6{Alow,Chi|[defer]}. This set's evaluation set was E5{[defer],Alow,Chi}.

Explicit trinary sets. In the trinary choice set condition, respondents choosing from S4{defer,Alow,Clow} had evaluation set E4{defer,Alow,Clow}. Those choosing from S5{defer, Alow,Chi} had evaluation set E5{defer,Alow,Chi}.

Predictions of Choice Patterns According to Relative Value Theory

Unknown competitor condition: Binary explicit choice sets

Figure 4-1 shows the "choice zone" predicted by our decision rule for binary evaluation sets wherein each brand's relative value was assessed in isolation: choose the proactive response if PRE(MedHi) ≥ 1. Since none of the brands was located in the choice zone, each should appear unattractive to a significant majority of respondents: P(A$low|defer) ≈ P(C$low|defer) ≈ P(C$hi|defer) < .5.

Known competitor conditions: Binary implicit choice sets and trinary explicit choice sets

Even when it is unavailable, knowledge of a competitor is relevant to the evaluation of a current product-option when inclusion of the known competitor in the evaluation set allows a more precise determination of the current product-option's incremental benefit-units' relative value. A comparison of Figures 4-1 and Figure 4-3 shows the change in the predicted choice-zone as a result of increasing the evaluation set from a binary to a trinary one due to the relevant information provided by a comparable competitor.

Specifically, Figure 4-2 shows the choice-zone created when A$low is known. All else equal, when A$low is known and it holds the intermediate benefit-position, the attractiveness of higher-benefit brands is significantly enhanced when they are located to the left of relative value vector $PRE_{A\$low} = 1$, irrespective of the availability of A$low. The attractiveness of higher-benefit brands relative to that of A$low increases with increasing movement to the left of $PRE_{A\$low} = 1$. Thus, when consumers have information of the existence of a relevant competitor, the likelihood of choosing the proactive response depends on the constructed evaluation set's PRE-structural configuration.

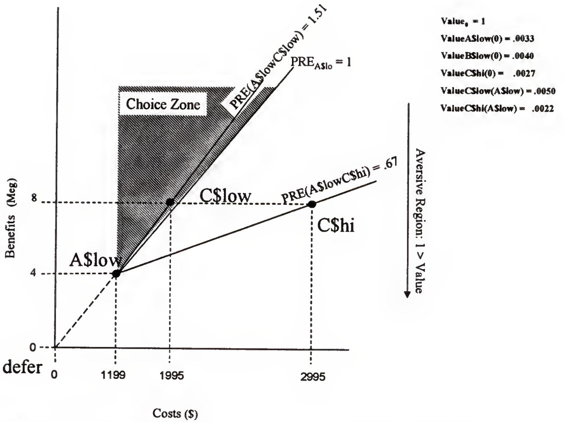


Figure 4-3. Choice-zone created when A$low is known and it holds the intermediate benefit-position.

Note that evaluation set {E4} has a polarization-type PRE-structural configuration (refer to Table 4-2) and that the within-set trend, PRE(LoHi) = .0040, engenders a negative evaluative context. In contrast, C$low's unique benefit-units seem to appreciate in relative value while A$low's intermediate common-benefit units appear to depreciate at a higher than the expected rate of .0040. This comparison indicates relative value is increasing at an accelerated rate in the coveted unique benefit-interval A$low→C$low. Note C$low's position within the predicted choice-zone in Figure 4-3. Thus, the likelihood that C$low is chosen should be significantly greater when A$low is known than when it is unknown, irrespective of A$low's availability: P(C$low|defer,[a$low]) ≈ P(C$low|defer,A$low) > .5 > P(C$low|defer).

Evaluation set {E5}'s attraction-type PRE-structural configuration indicates that C$hi's unique benefit-units depreciate at a worse than expected rate while A$low's incremental benefit-units depreciate at a lower than expected rate. Note A$low's position at the apex of the predicted choice-zone in Figure 4-3. Thus, the likelihood that A$low is chosen should be significantly greater when C$hi is known than when it is unknown, irrespective of C$hi's availability: P(A$low|defer,[c$hi]) ≈ P(A$low|defer,C$hi) > .5 > P(A$low|defer). In an opposite manner, as discussed above, the likelihood that A$low is chosen should be significantly decreased when A$low's known competitor is C$low instead of C$hi: P(A$low|defer,[c$hi]) ≈ P(A$low|defer,C$hi) > .5 > P(A$low|defer,[c$low]) ≈ P(A$low|defer,C$low).

Note C$hi is outside the choice-zone whether it is evaluated in isolation (see Figure 4-1) or in competition with A$low (see Figure 4-3). Thus, C$hi should appear to be an unattractive product in all choice sets: P(C$hi|defer,[a$low]) ≈ P(C$hi|defer,A$low) < .5 and P(C$hi|defer) < .5.[2]

Results

Binary free-product-choice sets

Unknown competitor condition: Binary choice sets with binary evaluation sets. Results are displayed in Table 4-2 for all buying conditions using Alow, Clow, and C$hi. Relative value theory suggests that when products are evaluated in binary free-choice evaluation sets, their attractiveness depends on the comparison of their perceived absolute value to a base reference value, i.e., $\text{Value}_0 = 1$ because they lack a competitive context. Since all brands had values that were very similar and less than one, respondents were expected to find the three brands similarly as aversive. As expected, the low level of attractiveness of Alow, Clow, and C$hi did not differ significantly, P(A$low|defer) =.12; P(C$low|defer) = .19; P(C$hi|defer) = .13 ($Z = 0.586$, $p =$

2 There is insufficient information upon which to base a prediction of C$hi's attractiveness across binary and trinary evaluative contexts.

0.57).[3] As a result, a significant majority opted to defer product-choice: $P(\text{defer}|J_{A\$low,\ C\$low,\ C\$hi}) =$ $.86$ ($Z_{H0:\ =.5} = 8.82$, $p < .0001$).

Table 4-2. Choice shares for available options in all buying conditions using Alow, Clow, and C$hi.

Evaluation Set *	Choice Set	N	Defer	Aggregate Product Shares	A$low	C$low	C$hi
Explicit Binary	**Binary** Free-Product-Choice						
{E1}	S1{defer,A$low}	25	.88	.12	.12		
{E2}	S2{defer,C$low}	16	.81	.19		.19	
{E3}	S3{defer,C$hi}	16	.87	.13			.13
	Explicit Totals	57	.86	.14			
Implicit Trinary	**Binary** Free-Product-Choice						
{E4}	S1{defer,A$low\|[c$low]}	16	.69	.31	.31	[N/A]	
{E5}	S1{defer,A$low\|[c$hi]}	16	.31	.69	.69		[N/A]
{E4}	S2{defer,C$low\|[a$low]}	16	.31	.69	[N/A]	.69	
{E5}	S3{defer,C$hi\|[a$low]}	15	.73	.27	[N/A]		.27
	Free-Product-Choice Totals	63	.52	.48			
	Forced-Product-Choice						
{E5}	S6{Alow,Chi|[defer]}	13	[N/A]	1.00	.92		.08
	Implicit Totals	76	.43	.57			
Explicit Trinary	**Trinary--** Free-Product-Choice						
{E4}	S4{defer,Alow,Clow}	17	.17	.83	.12	.71	
{E5}	S5{defer,Alow,Chi}	16	.06	.94	.69		.25
	Trinary Choice Set Totals	33	.12	.88			
	Binary Choice Set Totals	133	.62	.38			
	Trinary Evaluation Set Totals	109	.34	.66			
	Experiment Totals	166	.52	.48			

Note: * Refer to Table 4-2 for specific information of the evaluative sets' PRE-structural configurations. Refer to Figure 4-2 for specific information on the experimental design of the Free-product-choice condition.

Binary-explicit versus trinary-implicit evaluation sets. As predicted, the aggregate measure, $P(\text{defer}|J_{A\$low,\ C\$low,\ C\$hi})$, was significantly higher when Alow, Clow, and C$hi were

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[3] Proportional contrasts were tested as suggested by Rosenthal and Rosnow, 1985. The test statistic is a Z score calculated using: $Z_{calculated} = \sum Pi\ \lambda i/(\sum S^2_{Pi}\ Pi\ \lambda^2 i)^{1/2}$. Pi is the proportion choosing product i (i = Alow, Clow ,or C$hi) from a choice set; λi is a contrast coefficient; the sample variance is $S^2_{Pi} = [Pi(1 - Pi)/n]$; and n = the sample size.

evaluated in binary evaluation sets devoid of competition (.86) than when they were assessed in trinary evaluation sets (.52) that included a known but unavailable competitor ($Z_{1\text{-tailed}} = 4.76$, $p < .0001$). This difference (.34) depended on the expanded evaluation sets' PRE-structural configurations.

The predicted global interaction of brand x evaluation set's PRE-structural configuration was obtained ($Z = 7.06$, $p < 0.0001$). This information is summarized in Table 4-4. When A$low's evaluation set included C$hi, the resultant PRE-structural configuration {E5} favored A$low, thus enhancing A$low's relative value: P(A$low|defer[c$hi]) = .69 > P(A$low|defer) = .12. When A$low 's evaluation set included C$low, the resultant PRE-structural configuration {E4} disfavored A$low and the enhancement effect was missing: P(A$low|defer[c$low]) ≈ P(A$low|defer) ($Z_{1\text{-tailed}} = 3.53$, $p < 0.001$).

The reverse relationship also held: there was a significant interaction of high-benefit-brand-price x evaluation set ($Z_{1\text{-tailed}} = 3.149$, $p < 0.001$). When C$low's evaluation set included A$low, the resultant PRE-structural configuration {E4} favored C$low, thus enhancing its relative value: P(C$low|defer[a$low]) = .69 > P(C$low|defer) = .19. In contrast, this enhancement effect was absent for C$hi when its evaluation set included A$low because the resultant PRE-structural configuration {E5} disfavored C$hi: P(C$hi|defer[a$low]) ≈ P(C$hi|defer). As a result of the enhanced relative value of C$low when assessed in evaluation set {E4} and of A$low when assessed in evaluation set {E5}, respondents appeared to be "indifferent" between choosing defer or one of the brands: P(defer|J$_{\text{A\$low, C\$low, C\$hi}}$) = .52. The net effect of the diagnostic PRE-structural configuration on the enhanced brands was .55

Binary versus trinary choice sets

As predicted, the effect of choice-set size, binary versus trinary, on the brands' choice shares depended on whether their evaluation sets were the same or different. See Table 4-4. There was no effect of choice set size- on the shares of Alow, Clow, or C$hi when their evaluation sets coincided and their choice sets' sizes were either binary--implicit or trinary--explicit ($Z = 1.58$, p =

0.12). However, when their evaluation sets did not coincide, the difference in the brands' choice patterns was highly significant across choice set size binary--explicit or trinary--explicit ($Z = 5.44$, $p < .0001$).

Table 4-4. Aggregate product share by set type and PRE-structural configuration type.

Set Type	PRE-Structural Configuration	N	Defer	Aggregate Product Shares
Binary--Explicit				
	Non-Enhancing			
	{E1} for A$low			
	{E2} for C$low			
	{E3} for C$hi			
	Condition Total	57	.86	.14
Binary--Implicit				
	Non-Enhancing			
	{E4} for A$low			
	{E5} for C$hi			
	Total	31	.71	.29
	Enhancing			
	{E5} for A$low			
	{E4} for C$low			
	Total	32	.31	.69
	Condition Total	63	.52	.48
Trinary--Explicit				
	Non-Enhancing			
	{E4} for A$low			
	{E5} for C$hi			
	Total			.18
	Enhancing			
	{E5} for A$low			
	{E4} for C$low			
	Total			.70
	Condition Total	33	.12	.88

Forced-product-choice

Also as expected, A$low was chosen by a majority (.92) of respondents in forced-product-choice set {Alow,Chi|[defer]}. Thus, for all sets having evaluation set {E5}, A$low's relative and absolute shares were always greater than C$hi's shares even though when each was assessed

in isolation in {defer,A$low} or {defer,C$hi} their shares did not differ significantly (refer to Tables 4-2 and 4-3).

However, the unavailability of the inertial response had two effects on the choice shares realized by A$low. Respondents who would have preferred to choose the inertial response moved to A$low' position instead. In addition, since only the high-benefit sector benefit-positions are available, the within-set trend in relative value is more salient, thereby intensifying the effect of contrast. As a result, C$hi lost shares to A$low in the forced-choice format.

These results lend support to fundamental concepts of relative value theory: (a) the decision-making process is stable across choice-set formats and sizes. (b) consumers attend to choice-options' attribute levels and to those attributes' contextual interrelationships. (c) Proportional tradeoff rates are constructed utilizing available and relevant information to determine relative value. (d) Product choice is a manifestation of a relation-based preference structure.

Using the choice data generated by this study, I tested predictions derived from competing models of preference formation and choice as reviewed in Chapter 2. Refer to Tables 4-2 and 4-3, and to Figures 4-1 and 4-2. I report the results of these various tests in the next section. Although I show some of these models can account for different parts of the choice data, none of them can explain the entire pattern of choice.

Tests of Predictions by Competing Models

Testable restrictions of the product-preference based standard model of choice

Choice data from explicit free-product-choice sets S1{defer,A$low}, S2{defer,C$low }, S3{defer,C$hi } provide base-level information on the proportion of our test group for whom the three computers may be acceptable options: .12, .19, .13, respectively. With these data, we can construct bounds for the likelihood of product-choice from binary or trinary free-product-choice sets under the assumption that choice is based on stable product-preference.

Assumption of the standard model

Consumers are utility maximizers. Therefore, they choose so as to maximize utility. Hence, (a) for the proportion choosing the computer from {S1}, {S2}, or {S3}, the proactive response has greater utility than the inertial response; (b) for the proportion choosing to defer from {S1}, {S2}, or {S3}, the inertial response has greater utility than the proactive response. Consumers have stable preferences but consumers are heterogeneous in taste. Some taste-segments have strict preferences and only take their preferred product. Because consumers have stable-product preferences, the proportion of consumers opting for preferred options remains constant across decision occasions. Others have weaker preferences. Although they may prefer some products to other products, they are happy to take an acceptable product if their preferred product is not available (see Kreps, 1990). Context does not change option preference.

Estimation of lower-bound according to choice-set size

Given the above assumptions: (a) When only one brand is available for choice, the aggregate measure of the inertial response, $P(\text{defer}|J_{A\$low,\, C\$low,\, C\$hi})$, should not differ significantly across binary explicit and implicit sets. That is, $P(\text{defer}|J_{A\$low,\, C\$low,\, C\$hi})_{Binary\text{-}Explicit} \approx P(\text{defer}|J_{A\$low,\, C\$low,\, C\$hi})_{Binary\text{-}Implicit} = .86$. (b) When two brands are available, different lower bounds can be constructed depending on the mix of consumers with strict or weak preferences.

For example, at one extreme, we can conceive of those choosing the computer from S1{defer,A$low}, S2{defer,C$low}, or S3{defer,C$hi} as representing the proportion of the population having strict preference for A$low (.12), C$low (.19), or C$hi (.13). Even if one other computer were available, they would not change their choice. There were two trinary sets, S4{defer,Alow,Clow} and S5{defer,Alow, Chi}. Thus, the proportion choosing defer from $\{S4\}_{n=17}$ would be .69, while those choosing defer from $\{S5\}_{n=16}$ would be .75; hence, $P(\text{defer}|J_{A\$low,\, C\$low,\, C\$hi})_{Trinary} = .72$.

At the other extreme, we can imagine those who chose the computer from {S1}, {S2}, {S3} as having weak preferences. Some prefer high-benefit products others prefer low-benefit products. Then, at most, .32 will be happy to choose one of the computers available in trinary sets

{S4} or {S5}; hence, $P(\text{defer}|J_{A\$low, C\$low, C\$hi})_{Trinary}$ = .68. Mixtures of these two extreme segments would raise the magnitude of $P(\text{defer}|J_{A\$low, C\$low, C\$hi})_{Trinary}$ above the lower bound of .68.

Boundary conditions

Consequently, to qualify as a violation of the generalized axiom of revealed preference and a rejection of the standard product-preference-based choice model at least one of two conditions must hold. (a) The difference, $[P(\text{defer}|J_{A\$low, C\$low, C\$hi})_{Binary\text{-}Explicit} - P(\text{defer}|J_{A\$low, C\$low, C\$hi})_{Binary\text{-}Implicit}]$, would have to be significantly different from 0.0. (b) The difference, $[P(\text{defer}|J_{A\$low, C\$low, C\$hi})_{Binary} - P(\text{defer}|J_{A\$low, C\$low, C\$hi})_{Trinary}]$ would have to be significantly greater than .18

Boundary tests

Figure 4-4 shows the boundary conditions, as stipulated above, for the expected aggregate choice for the inertial response represented by the defer option for binary and trinary free-product-choice sets. The actual level of $[P(\text{defer}|J_{A\$low, C\$low, C\$hi})$ for each competitive condition is also shown (refer to Tables 4-2, 4-3, and 4-4 and to Figure 4-2 for further details).

Recall the binary choice sets were identical in composition across explicit and implicit conditions: S1{defer,A$low}, S2{defer,C$low}, and S3{defer,C$hi}. Yet, aggregate choice of deferral decreased .34 when respondents had acquired information about one other competitor prior to the binary choice task ($Z = 4.37$, $p < .001$). In trinary choice sets, the aggregate choice of deferral decreased to .12. This decrease was .56 lower than the estimated lower bound of .68 ($Z = 7.68$, $p < .0001$).

The aggregate choice-pattern displayed in Figure 4-4 is inconsistent with utility maximization as currently conceptualized under the standard choice model for the set of products Alow, Clow, and C$hi in both the implicit binary sets and the explicit trinary sets. In contrast, the choice pattern is entirely consistent with a relation-based preference model. More over, this paradigm facilitates the estimation of the significant effects of the relational structure (.55) and of acquired information (.19) on the aggregate product-shares, $Z = 7.06$, $p < .0001$ and $Z = 2.61$, $p < .01$, respectively.

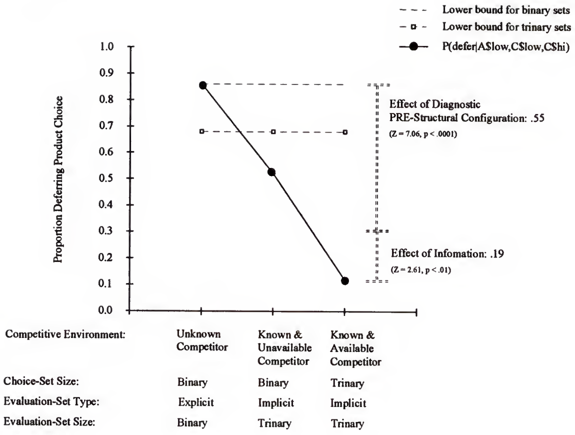

Figure 4-4. Effect of the evaluation set's diagnostic PRE-structural configuration and of information about competing brands on the decision to defer product acquisition, $\chi^2_{(1)} = 20.3$, $p < .0001$. Refer to Tables 4-2, 4-3 and 4-4, and to Figure 4-2 for more detailed information.

Hypothesized effects of information

Consumers use observations of market offerings to adjust their reservation thresholds represented by their willingness-to-pay (WTP) (e.g., Goering, 1986; Karni and Schwartz, 1977; Kohn and Shavell, 1974; Rothschild, 1974). For example, buyers adjust their expectations of quality after having made an observation from a product class (e.g., Goering, 1986; Prelec et al., 1995; Wernerfelt, 1995), i.e., observations of market offerings may change the importance weight of benefit product-attributes. If a current product offering's quality is higher than the average quality experienced in the past WTP should rise for the current period and vice versa (see Goering 1984, 1986). The implication is that both C$low and C$hi should be more attractive after

respondents acquired information about A$low (known & unavailable competitor condition) than before such information was available (unknown competitor condition). But, A$low should be less attractive after exposure to C$low and C$hi (known & unavailable competitor condition) than before exposure (unknown competitor condition). Recall there were no significant differences in the level of attractiveness for all three computers in the unknown competitor condition. Thus, a further implication is that the proportion deferring choice should be greater for S1{defer,A$low} than the combined proportion deferring choice across S2{defer,C$low} and S3{defer,C$hi}, i.e., $P(\text{defer}|\text{A\$low}\}_{\text{Implicit}} > P(\text{defer}|\text{C\$low,C\$hi})_{\text{Implicit}}$.

Neither premise was supported. As reported before, the attractiveness of both A$low and C$low increased when their corresponding expanded evaluation sets' PRE-structural configurations enhanced their relative value. Also, both A$low and C$hi's attractiveness did not vary significantly when their corresponding expanded evaluation sets' PRE-structural configurations did not enhance their relative value. The end result of the split conditions was that the proportion (0.50) of respondents choosing A$low when its implicit context was C$low or C$hi did not differ significantly ($Z = 0.423$, $p = .67$). from the proportion (0.48) opting for C$low or C$hi when their implicit context was A$low.

As currently conceptualized, the conjecture that using observations of market offerings to update WTP could only account for the increased attractiveness of C$low after exposure to A$low but it could not account for the choice data from the other three sets. However, as shown in Table 4-4 and Figure 4-4, controlling the evaluation sets' PRE-structural configurations allowed the estimation of a significant effect of information on the proactive response (.19) above the effect explained by the enhancing PRE-structural configurations.

Hypothesized effect of contingent-weighting and differential loss aversion

Compatibility principle and differential loss aversion. By the compatibility principle (Shafir, 1993), benefits receive higher weight than costs in choice tasks because attractive

attributes are compatible with preference formation. This conjecture is in accord with research suggesting that in a buying context benefits are more prominent than price and should induce greater loss aversion for quality than for price (e.g., Hardie et al., 1993; Kahneman et al., 1990; Simonson and Tversky, 1992; Tversky and Kahneman, 1991; Tversky and Simonson, 1993). Moreover, Tversky and Kahneman (1991; also see Kahneman, 1992) concur and assert buyers do not experience loss aversion during purchase activities because money is seen as an instrument of exchange.

By these premises, A$low's benefit disadvantage should appear as a substantial loss when compared to either C$low or C$hi; thus, A$low's attractiveness should be highest in the unknown-competitor condition and equally lower in the two known competitor conditions. Because C$low's and C$hi's disadvantages relative to A$low are in terms of their prices, both should be equally more attractive when compared to A$low in the two competitor conditions than when no comparison is possible in the known competitor condition. This implies a significant interaction of amount of computer memory (4 Megs vs. 8 Megs) and competitive context (none vs. implicit) within binary choice set type. This interaction was not significant ($Z = 0.399$, $p = 0.65$).

Note that even though the starting premises here are different from those of the hypothesized effect of information on the variability of WTP, their predictions were similar. As reported above, the current premises were not supported for low-benefit A$low and high-benefit C$hi. However, they are supported by the consistent increase in C$low's level of attractiveness when contrasted to A$low.

<u>The unavailable competitor effect</u>. Pratkanis and Farquhar (1992) posit that knowledge of a currently unavailable competitor leads to an overweighing of the attribute in which the unavailable competitor excels relative to a current target option. This implies A$low should do worse in binary implicit sets where it can be compared to unavailable C$low or C$hi because both computers "excel" by having higher levels of benefits than A$low. C$low and C$hi should also do worse in the implicit set condition where they can be compared to the unavailable A$low because it "excels" by having lower price.

As a result, this premise predicts a significant simple effect of competitive context within binary choice set type. Due to the experimental design, this hypothesis indicates that the incidence of product choice deferral should be greater when target products are evaluated in an implicit competitive competition versus when they are evaluated in the no competitive context condition. As shown in Table 4-3, the direction of the large effect (-.34) was exactly opposite to the one hypothesized ($Z_{\text{1-tailed}} = -4.76$, $p < 0.0001$).

Hypothesized effect of task difficulty

The difficulty of a product choice decision increases when a choice set is composed of non-dominated options that are also similar in degree of attractiveness; increasing decision difficulty increases choice deferral (e.g., Tversky and Shafir, 1992a). These premises predict a significant simple effect of choice-set size. The incidence of product choice deferral should be greater when respondent choose from trinary free-product-choice sets S4{defer,Alow,Clow} and S5{defer,Alow,Chi} than from binary free-product-choice sets S1{defer,A$low}, S2{defer,C$low}, and S3{defer,C$hi}.

The proportion choosing Alow, Clow, or C$hi from explicit-binary sets S1{defer,A$low}, S2{defer,C$low}, or S3{defer,C$hi} did not differ significantly: 12, .19, .13, respectively. As shown in Table 4-3 and Figure 4-4, the simple effect of choice set size was significant but in the opposite direction than hypothesized by Tversky and Shafir, i.e., choice deferral decreased significantly ($Z = 5.44$, $p < .0001$).

Hypothesized effects of status quo bias in buying situations

Buyers are loss averse, hence, all else equal, giving up part of their money endowment should carry a greater weight than an equivalent acquisition of product-benefits. This premise implies that buyers will not be proactive in the market place unless there is consumer surplus to be realized through a purchase activity, i.e., WTP > 0. Respondents' choices appear in accord with

this premise since the majority (.86) opted to defer in the explicit-binary condition: S1{defer,A$low}, S2{defer,C$low}, and S3{defer,C$hi}. However, unless the WTP measure is defined in terms of PRE-units, the remainder of the buying choice data does not support this premise except for the high proportion choosing to defer from implicit-binary S1{defer,A$low|[c$low]} or S3{defer,C$hi|[a$low]}. But, then, the implicit-PRE-structural configurations for these two sets were designed to be non-enhancing to the target brands, A$low and C$hi.

Summary

As proposed by relative value theory, the findings of the buying experiment reported in this chapter offer evidence of respondents' use of evaluation sets composed of relevant attribute information irrespective of the immediate availability of the products providing such information. (see Figure 3-1 in Chapter 3). These findings also point to respondents' use of the implicit relational structure of the evaluation sets in choosing their preferred option during the current decision event. This relational structure is modeled by the evaluation set's PRE-structural configuration, which incorporates product-options' pairwise proportional rates of exchange. Moreover, respondents' apparent use of the diagnostic value of the evaluation sets' PRE-structural configuration to guide choice in free-product-choice sets, parallels their use by respondents in forced-product-choice sets as previously reported by Hollman and Lynch (1997). In the next chapter, I examine whether relative value theory may help explain selling behavior.

CHAPTER 5
EQUIVALENCE OF DECISION-MAKING PROCESS ACROSS TRANSACTION PERSPECTIVES: SELLING VERSUS BUYING

Overview

Relative value theory asserts there is a constant process through which both buyers and sellers construct their preferences and choose. The differences in buyers' and sellers' choices are a direct result of the transaction-goal-dependent differences in the identity of the benefit and cost inputs to their equivalent decision-making processes. Due to the constancy of the process and the goal-dependency of the assignation of benefit or cost status to decision attributes, the above argument indicates the observed differences of buyers' and sellers' choices are amenable to theoretical analysis and prediction prior to choice. This is the theme of this chapter.

Proposition of Theory Tests Across Transaction Perspectives

Overview

Standard economic assumptions specify no effect of transaction perspective in the absence of transaction costs and income effects (Kahneman et al, 1990). According to the Coase theorem, goods end up in the hands of those who most value them irrespective of the initial assignment of property rights (Coase, 1960; also see Barzel and Kochin, 1992; De Serpa, 1992; Norton, 1987; Kahneman et al, 1990). Moreover, according to this traditional view, the level of product-choice "reveals" the level of product-based preference. This implies the proportion buying A or selling A will be similar, respectively, to the proportion deferring to sell A or deferring to buy A whenever buyers and sellers agree in their valuation of product A (see Figure 2-4 in Chapter 2). Thus, all

else equal, the difference in the proportion of owners selling versus buyers buying indicates the degree to which buyers and sellers agree on A's value:

(5.1) $V_A = [P(\text{buy A}|\text{defer:keep } \$x_A) - P(\text{defer:keepA}|\text{sell } A_{\$xA})]$

The magnitude of V_A indicates how desirable ownership of A's product-benefits are relative to ownership of the stated amount of flexible asset $\$x_A$ required to effect A's trading transaction as a function of transaction perspective. The possible range of V_A is (-1,1). When V_A = 0, owners and buyers are in agreement on the valuation of A's product-benefits—the proportion of owners desiring to keep A is similar to the proportion of buyers desiring to acquire A. When V_A < 0, a greater proportion of owners than of buyers perceive A's product-benefits to be underpriced—more owners defer to sell A than buyers desire to buy A. When V_A > 0, a greater proportion of owners than of buyers agree that A's product-benefits are overpriced—more owners desire to sell A than buyers desire to buy A. The polarization of buyers' and owners' valuation of A's product-benefits increases as V_A approaches 1 or V_A approaches -1.

Moreover, just as buyers are expected to defer purchasing A unless they at least break even (WTP ≥ 0), sellers should be unwilling to sell A unless they at least break even. That is, sellers' "willingness-to-accept" should be non-negative for them to accept a stated price for selling A:

(5.2) $$\text{WTA(A)} = \left[1 - \left(\frac{(UtilityA_{owned}/1Aunit)}{(priceA_{revenue}/1Aunit)}\right)\right] \geq 0.$$

Note that the sellers' WTA(A) is conceptualized as the reverse of the buyers' WTP(A) (refer to Equation 2.2, in Chapter 2). Thus, the greater the proportion of sellers choosing to sell A at price $\$x_A$, allowing us to surmise WTA(A) ≥ 0, the more confident we are supposed to be in assuming that price $\$x_A$ yields a transaction deficit to buyers: WTP(A) < 0.

As a result, when decision-makers perceive A to be "underpriced," a majority of owners should defer selling A and a minority of buyers should defer buying A (endowment effect), yielding the following prediction:

(P.5.1) $A_{\text{underpriced: \$ValueA > 1}}$: $P(\text{defer:keep A}|\text{sell } A_{\$xA}) \approx P(\text{buy } A_{\$xA}|\text{ defer:keep } \$x_A) > .5$.

Note that the buyers' and owners' decisions predicted by P.5.1 could be stated in two factually correct ways that, nonetheless, foster different interpretations of the decision-makers' actions. For example, we could highlight the equivalent nature of the buyers' and owners' actions: "Just as A's owners, buyers of A exhibited a preference for ownership of fixed-assets over flexible-assets at the stated trading rate." Or, we could highlight their differential preference for owned versus new assets: "Contrary to buyers of A, owners of A exhibited a preference for their owned assets over the acquisition of new assets." The latter interpretation is the one predicated by advocates of a loss aversion explanation of the endowment effect.

Conversely, the behavioral principle of loss aversion, formalized by prospect theory (Kahneman and Tversky, 1979), also implies that the reverse relationship must hold. Hence, when decision-makers perceive A to be "overpriced," a minority of owners should defer selling A and a majority of buyers should defer buying A ("reverse" endowment effect), yielding the following prediction:

(P.5.2) $A_{\text{overpriced: SValueA} < 1}$: P(defer:keep A|sell $A_{\$x_A}$) ≈ P(buy $A_{\$x_A}$| defer:keep $\$x_A$) < .5.

Recall from Chapter 2 that in specified conditions both standard economic theory and endowment effects due to loss aversion predict the same buyer-seller behaviors depicted in P.5.1. The predictions hold for both theoretical frameworks when the choice context is binary (e.g. {defer:keep A,sell $A_{\$x_A}$} and {defer:keep $\$x_A$,buy $A_{\$x_A}$}) and A's value is at least at unity (SValueA ≥ 1). Relative value theory also predicts the same choice patterns given the specified conditions.

On the other hand, these three theoretical viewpoints do differ in their explanations of the decision-making process producing the buyers' and sellers' observed choice behaviors. As a result, the standard context used to demonstrate endowment effects (e.g. {defer:keep A,sell $A_{\$x_A}$}, {defer:keep $\$x_A$,buy $A_{\$x_A}$}, and SValueA ≥ 1) cannot be used to test which theories provides a better explanation of the decision-making processes underlying buying and selling behaviors. However, using overpriced options while expanding the decision context to a trinary one does allow for a direct test of each theory's explanatory power.

Economic Perspective Predictions

Assume a similar majority of sellers dispose of A\$low, C\$low and C\$hi when presented with binary selling choice sets such that P(defer:keep A\$low|sell $A_{\$xA\$low}$) ≈ P(defer:keep C\$low|sell $C_{\$xC\$low}$)≈ P(defer:keep C\$hi|sell $C_{\$xC\$hi}$) < .5. That is, the majority of owners show a preference for revenue (acquisition of flexible-assets) over ownership of product-benefits (specific-assets). Given these results, we surmise that sellers perceived each computer to be overpriced. This conclusion is bolstered by the fact that a similar majority of buyers deferred purchase of these computers at the stipulated prices (see Table 4-2 in Chapter 4). Thus, $V_{A\$low,\,C\$low,\,C\$hi}$ should be equal to 0.

From an economic perspective standpoint, decision-makers' valuation processes are context independent (IIA property). Given this assumption, increasing a selling or buying choice set by introducing a similarly valued option should not have an impact on the relative desirability of selling or buying the competing products. Hence, adding A\$low to selling sets {defer:keep C\$low,sell $C\$low_{\$xC\$low}$} and {defer:keep C\$hi,sell $C\$hi_{\$xC\$hi}$} or to buying sets {defer:keep $\$x_{C\$low}$,buy C\$low} and {defer:keep $\$x_{C\$hi}$,buy C\$hi} yields the following economic viewpoint predictions:

(P.5.3) $$\left[\frac{P(sellA\$low_{\$xA\$low} \mid defer:keep_{A\$low})}{P(sellC\$low_{\$xC\$low} \mid defer:keep_{C\$low})}\right] \approx \left[\frac{P(sellA\$low_{\$xA\$low} \mid defer:keep_{Both,\,C\$low})}{P(sellC\$low_{\$xC\$low} \mid defer:keep_{Both,\,A\$low})}\right] \approx 1,$$

(P.5.4) $$\left[\frac{P(sellA\$low_{\$xA\$low} \mid defer:keep_{A\$low})}{P(sellC\$hi_{\$xC\$hi} \mid defer:keep_{C\$hi})}\right] \approx \left[\frac{P(sellA\$low_{\$xA\$low} \mid defer:keep_{Both,\,C\$hi})}{P(sellC\$hi_{\$xC\$hi} \mid defer:keep_{Both,\,A\$low})}\right] \approx 1,$$

(P.5.5) $$\left[\frac{P(buyA\$low_{\$xA\$low} \mid defer:keep\$x_{A\$low})}{P(buyC\$low_{\$xC\$low} \mid defer:keep\$x_{C\$low})}\right] \approx \left[\frac{P(buyA\$low_{\$xA\$low} \mid defer:keep\$x_{A\$low,\,C\$low})}{P(buyC\$low_{\$xC\$low} \mid defer:keep\$x_{A\$low,\,C\$low})}\right] \approx 1,$$

(P.5.6) $$\left[\frac{P(buyA\$low_{\$xA\$low} \mid defer:keep\$x_{A\$low})}{P(buyC\$hi_{\$xC\$hi} \mid defer:keep\$x_{C\$hi})}\right] \approx \left[\frac{P(buyA\$low_{\$xA\$low} \mid defer:keep\$x_{A\$low,\,C\$hi})}{P(buyC\$hi_{\$xC\$hi} \mid defer:keep\$x_{A\$low,\,C\$hi})}\right] \approx 1,$$

(P.5.7) $V_{A\$low,C\$low,C\$hi} = V_{A\$low|C\$low} = V_{A\$low|C\$hi} = V_{C\$low|A\$low} = V_{C\$hi|A\$low} = 0.$

One could argue also that the net selling values of A\$low, C\$low, and C\$hi are equivalent since equal majorities of sellers were willing to sell each of the computers at their stated prices.

The same argument holds for the equivalence of the computers' net buying values. Using a traditional economic perspective's "rationality" argument yields competing predictions for relative product-choice across binary and trinary evaluative contexts: (a) Owners who sell should maximize revenues by disposing of the expensive computer. (b) Buyers deciding to buy should minimize expenses by acquiring the less expensive computer. Thus, when A\$low is added to selling sets {defer:keep C\$low,sell C\$low$_{\$x_{C\$low}}$} and {defer:keep C\$hi,sell C\$hi$_{\$x_{C\$hi}}$} or to buying sets {defer:keep \$x$_{C\$low}$,buy C\$low} and {defer:keep \$x$_{C\$hi}$,buy C\$hi}, the following predictions should hold:

(P.5.8) $$\left[\frac{P(sellA\$low_{\$xA\$low} \mid defer : keep_{A\$low})}{P(sellC\$low_{\$xC\$low} \mid defer : keep_{C\$low})}\right] \approx 1 > \left[\frac{P(sellA\$low_{\$xA\$low} \mid defer : keep_{Both,\, C\$low})}{P(sellC\$low_{\$xC\$low} \mid defer : keep_{Both,\, A\$low})}\right],$$

(P.5.9) $$\left[\frac{P(sellA\$low_{\$xA\$low} \mid defer : keep_{A\$low})}{P(sellC\$hi_{\$xC\$hi} \mid defer : keep_{C\$hi})}\right] \approx 1 > \left[\frac{P(sellA\$low_{\$xA\$low} \mid defer : keep_{Both,\, C\$hi})}{P(sellC\$hi_{\$xC\$hi} \mid defer : keep_{Both,\, A\$low})}\right],$$

(P.5.10) $$\left[\frac{P(buyA\$low_{\$xA\$low} \mid defer : keep\$x_{A\$low})}{P(buyC\$low_{\$xC\$low} \mid defer : keep\$x_{C\$low})}\right] \approx 1 < \left[\frac{P(buyA\$low_{\$xA\$low} \mid defer : keep\$x_{A\$low,\, C\$low})}{P(buyC\$low_{\$xC\$low} \mid defer : keep\$x_{A\$low,\, C\$low})}\right],$$

(P.5.11) $$\left[\frac{P(buyA\$low_{\$xA\$low} \mid defer : keep\$x_{A\$low})}{P(buyC\$hi_{\$xC\$hi} \mid defer : keep\$x_{C\$hi})}\right] \approx 1 < \left[\frac{P(buyA\$low_{\$xA\$low} \mid defer : keep\$x_{A\$low,\, C\$hi})}{P(buyC\$hi_{\$xC\$hi} \mid defer : keep\$x_{A\$low,\, C\$hi})}\right].$$

Note that predictions P.5.3, P.5.4, P.5.5, and P.5.6 imply no effect of choice set size on relative product-choice. In contrast, predictions P.5.8, P.5.9, P.5.10, and P.5.11 imply an effect of choice set size on relative product-choice that enhances preference for ownership of A\$low's product-benefits in all competitive contexts.

Loss Aversion Predictions

In a selling context, loss aversion implies that decision-makers tend to minimize the loss of currently held product-benefit assets (Kahneman and Tversky, 1979, 1983; Kahneman et al., 1986, 1988, 1990; Knetsch and Sinden, 1984, 1987; Tversky and Kahneman, 1991; Winer, 1986). In contrast according to Tversky and Kahneman (1991), buyers are not averse to losses due to

expenditures of money in exchange for product-benefits (also see Kahneman, 1992; Kahneman et al, 1988, 1990; Simonson and Tversky, 1992).

That is, decision-makers are averse to losses due to the diminution of currently held fixed assets but they are not equivalently averse to losses due to the diminution of currently held flexible assets. These premises imply that unlike owners' product-benefit-loss-minimization strategy, buyers do not view the minimization of their currently held money-assets as a primary concern. Thus, under this modified loss aversion premise, buyers pursue a product-benefit maximization strategy (e.g., Kahneman et al, 1988, 1990; Shafir, 1993; Tversky and Kahneman, 1991; Shafir, 1993; Simonson and Tversky, 1992; Winer, 1986). This expected differential behavior of buyers and sellers has been termed the endowment effect (e.g., Kahneman et al., 1988, 1990; Knetsch, 1989, 1992; Knetsch and Sinden, 1984, 1987; Thaler, 1980).

The decision process underlying endowment effects has been explained in terms of loss-aversion-driven differential valuation processes for buyers and sellers (e.g., Kahneman et al., 1988, 1990; Knetsch, 1989, 1992; Knetsch and Sinden, 1984, 1987). Because owners see the trading transaction in terms of a loss, they <u>overvalue</u> product-benefits. Buyers are not willing to pay high prices because they view the acquisition of product-benefits as a gain. Thus, buyers are induced to <u>undervalue</u> product-benefits even though buyers pursue a product-benefit maximization strategy (e.g., Kahneman et al., 1988, 1990).

The implication is that an owner's subjective product-benefit utility is greater than that of the buyer (see Equation 2.6 in Chapter 2). That is, if $U(A)_{buy}$ represents the buyer's perceived utility for A's benefits, then the owner's utility is:

(5.3) $U(A)_{own} = \lambda U(A)_{buy}\ ;\ \lambda > 1,$

where λ is the loss-aversion-induced overweighting of A's product-benefits by the potential sellers. According to loss aversion, then, a price perceived by buyers as acceptable must be perceived by owners as aversive and vice versa.

If the desire to maximize "gains" (revenue or acquisition of product-benefits) differs from the desire to minimize "losses" (disposal of product-benefits, expenses), this difference must be reflected as a predictable variability in sellers' and buyers' decisions across binary and trinary sets.

By loss aversion, a loss is more painful than a corresponding gain is pleasurable and loss increases are more painful than equivalent gain decreases (Kahneman et al., 1986; Tversky and Kahneman, 1991). Thus, a further implication is that owners' perceptions of losses should increase with increasing level of product-benefits owned. For example, the incremental loss of giving up an additional 4 megs should be more painful to the sellers than the corresponding additional revenue gain due to the sale of either high-benefit computer. As a result of loss aversion, owners' should prefer to dispose of A\$low when it is introduced into selling sets {defer:keep C\$low,sell C\$low$_{\$XC\$low}$} and {defer:keep C\$hi,sell C\$hi$_{\$XC\$hi}$}, yielding the following predictions:

$$\text{(P.5.12)}\quad \left[\frac{P(sellA\$low_{\$xA\$low}|defer:keep_{A\$low})}{P(sellC\$low_{\$xC\$low}|defer:keep_{C\$low})}\right]\approx 1<\left[\frac{P(sellA\$low_{\$xA\$low}|defer:keep_{Both,\,C\$low})}{P(sellC\$low_{\$xC\$low}|defer:keep_{Bth,\,A\$low})}\right],$$

$$\text{(P.5.13)}\quad \left[\frac{P(sellA\$low_{\$xA\$low}|defer:keep_{A\$low})}{P(sellC\$hi_{\$xC\$hi}|defer:keep_{C\$hi})}\right]\approx 1<\left[\frac{P(sellA\$low_{\$xA\$low}|defer:keep_{Both,\,C\$hi})}{P(sellC\$hi_{\$xC\$hi}|defer:keep_{Bth,\,A\$low})}\right].$$

Note that economic predictions P.5.8 and P.5.9 are directly opposite to differential loss aversion predictions P.5.12 and P.5.13, respectively. That is, P.5.12 and P.5.13 imply an effect of choice set size on relative product choice that enhances preference for ownership of C\$low's or C\$hi's product-benefits in competitive selling contexts.

There is an additional implication for the behavior of buyers. Adding A\$low to buying sets {defer:keep \$x$_{C\$low}$,buy C\$low} and {defer:keep \$x$_{C\$hi}$,buy C\$hi} should have no effect on the relative preference for any of the competing computers. That is, buyers should continue to perceive the computers as aversive in either binary or trinary contexts, yielding the following predictions:

$$\text{(P.5.14)}\quad \left[\frac{P(buyA\$low_{\$xA\$low}\,|\,defer:keep\$x_{A\$low})}{P(buyC\$low_{\$xC\$low}\,|\,defer:keep\$x_{C\$low})}\right]\approx\left[\frac{P(buyA\$low_{\$xA\$low}\,|\,defer:keep\$x_{A\$low,\,C\$low})}{P(buyC\$low_{\$xC\$low}\,|\,defer:keep\$x_{A\$low,\,C\$low})}\right]\approx 1,$$

(P.5.15) $$\left[\frac{P(buyA\$low_{\$xA\$low} \mid defer: keep\$x_{A\$low})}{P(buyC\$hi_{\$xC\$hi} \mid defer: keep\$x_{C\$hi})}\right] \approx \left[\frac{P(buyA\$low_{\$xA\$low} \mid defer: keep\$x_{A\$low,\, C\$hi})}{P(buyC\$hi_{\$xC\$hi} \mid defer: keep\$x_{A\$low,\, C\$hi})}\right] \approx 1,$$

Note that economic predictions P.5.6 and P.5.7 are the same as loss aversion's predictions P.5.14 and P.5.15. Thus, from a modified loss aversion perspective, the expected effect of competitive context is not uniform across selling and buying transactions. This expectation is a direct result of the differential degree of loss aversion to decreases of owned assets experienced by buyers and owners as hypothesized by Tversky and Kahneman (1991). The differential valuation strategies can be tested directly via the resulting predictions P.5.16 and P.5.17:

(P.5.16) $V_{A\$low|C\$low} \approx V_{A\$low|C\$hi} > 0$ (reversed-endowment effect),

(P.5.17) $V_{C\$low|A\$low} \approx V_{C\$hi|A\$low} < 0$ (endowment effect).

Relative Value Predictions

Overview

In Chapter 2, I intimated relative value theory provided a different way to view the reasons for the observed asymmetries in buyers' and sellers' respective choice behaviors. According to relative value theory, buyers and owners try to balance two conflicting wants: they want to maximize their transaction benefits but they also want to minimize their transaction costs. Buyers and owners also have the same overarching goal: obtaining the highest relative value per transaction. Moreover, buyers and owners use the same decision process. However, they view the decision problem from opposite perspectives.

Recall from Chapter 4 that a significant majority (.86) of buyers deferred product purchase when they assessed A\$low, C\$low, or C\$hi in the absence of competition. For the buyers, the computers appeared to be in the "aversive" region where Value < 1 and costs seem excessive. Moreover, according to the traditional view, the level of product-choice "reveals" the level of product-based preference. Since all three computers were similarly aversive to respondents, we surmise the three computers also must have appeared to respondents to have similar levels of consumer deficit.

The implication is that WTP < 0 for Alow, Clow, or C$hi. By definition, then, WTA > 0 to a similar extent across computers. Thus, the sellers should be willing to accept the stated prices. Note, however, that the buyers' transaction benefits are the sellers' transaction costs and vice versa. As a result, for the sellers, the computers should appear to be in the "attractive" region where Value > 1 and there seem to be excess transaction benefits to be enjoyed.

Figure 5-1 shows the same computer brands used in Chapter 4 from the two simultaneous and reciprocal perspectives of buyers and sellers. (The buyers' perspective is as we saw in Figure 4-1). Seeing the buyers' and sellers' decision spaces as reciprocal suggests a redefinition of the corresponding willingness-to-pay and willingness-to-accept concepts.

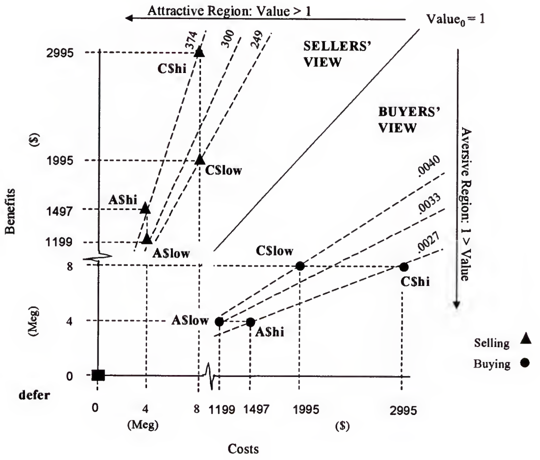

Figure 5-1. Four brands of personal computers as seen through the reciprocal perspectives of buyers and sellers.

Previously, I defined as proactive responses those decisions entailing a change from the steady state represented by the status quo. Thus, both buying and selling are proactive responses. Furthermore, proactive responses are opposite to the passive stance connoted by the inertial response of choosing to defer. The terms WTA and WTP connote a passive stance in, respectively, selling and buying contexts. As a result, I will use the parallel concepts of willingness-to-sell, WTS, and willingness-to-buy, WTB, because they are more representative of the proactive responses of selling and buying.

Whereas WTB denotes the disposing of owned money-assets in exchange for acquiring product-benefit-assets, WTS denotes the disposing of owned product-benefit-assets in exchange for acquiring money-assets. The parallelism of the WTB and WTS concepts allows us to define them at a more general level in terms of transaction benefits and transaction costs:

(5.4) $$\text{WTS(A)} = \left(\frac{Benefit(SellA)}{Cost(SellA)} - 1\right) \geq 0,$$

(5.5) $$\text{WTB(A)} = \left(\frac{Benefit(BuyA)}{Cost(BuyA)} - 1\right) \geq 0.$$

Now, we will be able to equate these two concepts through proportional rates of exchange in terms of each trader's benefits and costs. Consequently, for a fixed choice set, e.g., {defer,A$low}, the set's proportional rate of exchange from the buyers' perspective is the inverse of the seller's perceived proportional rate of exchange, namely:

(5.6) $$\text{PRE(deferA\$low)}_{\text{Buy}} = \frac{ValueA\$low(0)}{Value_0} = \frac{BenefitA\$ow(0)}{CostA\$low(0)},$$

(5.7) $$\text{PRE(deferA\$low)}_{\text{sell}} = \frac{ValueA\$low(0)^{-1}}{Value_0} = \frac{CostA\$low(0)}{BenefitA\$low(0)},$$

(5.8) $$\text{PRE(deferA\$low)}_{\text{Buy}} = \text{PRE(deferA\$low)}_{\text{sell}}^{-1}.$$

All else equal, Equations 5.6, 5.7, and 5.8 imply buying and selling prices should not coincide unless (a) the evaluation set's PRE-structural configuration is non-diagnostic, i.e., PRE =

1; or, (b) all options' absolute values are at unity, i.e., $Value_0=1$. [1] Note that this expectation holds even if buyers and sellers were to agree precisely as to the levels of perceived benefits and costs as well as to the importance weights given to such attributes. Moreover, buyers' evaluation sets will be located in a decision space that is the inverse of the sellers' decision space when options' benefits do not equal their costs. That is, options with Value < 1 are located in the aversive region where there are excess costs. Options with Value > 1 are located in the attractive region where there are excess benefits. If coincidentally the options' proportional rate of exchange is diagnostic, (PRE ≠ 1), buyers' and sellers' evaluation sets also will have inverse PRE-structural-relationships.

Experimental setting

Manipulation of selling-decision urgency within selling condition. As for the buying condition, respondents read a context-paragraph designed to induce one of two levels of selling-decision urgency: Intermediate--free-selling-choice condition--or High--forced-selling-choice condition. The basic text of the context-paragraph was similar across free- and forced-selling-choice conditions with the exception of the sections in bold type as noted in Table 5-1.[2]

Manipulation of the evaluation sets. There was one forced-choice set: S7{Ahi,Chi}. As in the buying condition, respondents were given one of two types of selling sets to consider, but, unlike the buying condition, all selling sets were explicit sets--i.e., their evaluation sets were expected to be the same as the choice set. (a) binary selling sets S1{defer,A$low }, S2{defer,C$low}, and S3{defer,C$hi}; (b) trinary selling sets S4{defer, Alow, Clow} or S5{defer, Alow, Chi}, where the defer option signifies respondents opted to keep both computers. The specific structure of each evaluation set is shown in Table 5-2. The four computer brands were not fully crossed. Figure 5-2 shows a schematic diagram of the tests to be reported in

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[1] Note that PRE(AC) = 1 whenever ValueA(0) = ValueC(A). Refer to Table 1.1 in Chapter 1 and Equation 3.5 in Chapter 3.

[2] As was true for the buying context-paragraph, the free-choice context-paragraph differed across binary and trinary free-selling-choice sets as shown within the brackets, [...]. These differences were strictly intended to accommodate language requirements due to changing from a singular product to a pair of products and will not be mentioned further.

this chapter using computers Alow, Clow, or C$hi. Tests using computers A$hi and C$hi will be reported in Chapter 6.

Table 5-1. Selling condition context-paragraphs used to induce one of two levels of selling decision-urgency.

High decision-urgency: Forced-selling-choice condition
Below there are two items. Assume that you own these personal computers. You have decided to sell one computer to raise funds to buy some other equipment that you need for your work. After posting a flyer in several areas of Bryan and Matherly Halls describing the personal computers and requesting offers, you have received several offers from buyers. The two computers differ only in the amount of RAM memory as described below. You have narrowed the offers to the best ones, received from buyer A for computer A and from buyer B for computer B. You have to make a choice **now on which computer to sell** at the price stated. Please indicate your choice in the space provided below the description of your personal computers and the offer from the potential buyer.
Intermediate-decision urgency. Free selling-choice condition
Below there [is/are] two items. Assume that you own [this/these] personal computers. You have decided to sell [the/one] computer to raise funds to buy some other equipment that you need for your work. After posting a flyer in several areas of Bryan and Matherly Halls describing the personal computer[s] and requesting offers, you have received several offers from buyers. [The two computers differ only in the amount of RAM memory as described below.] You have narrowed the offers to the best one[s], received from buyer A for computer A [and from buyer B for computer B]. You have to make a choice on **whether to sell [one of your] computer[s]** at the price stated **or not to sell [either/the] computer**. Please indicate your choice in the space provided below the description of your personal computer[s] and the offer[s] from the potential buyer[s].

Table 5-2. Evaluation sets' within-set relative value structure for buying choice sets shown in Figure 5-2.

Evaluation Set	**PRE-Structural Configuration**
Binary Explicit Sets	
E6{defer,A$low}	[PRE$_\infty$=1<PRE(LoHi)]=[PRE$_\infty$=1<PRE(deferA$low)=300]
E7{defer,C$low}	[PRE$_\infty$=1<PRE(LoHi)]=[PRE$_\infty$=1<PRE(deferC$low)=249]
E8{defer,C$hi}	[PRE$_\infty$=1<PRE(LoHi)]=[PRE$_\infty$=1<PRE(defer C$hi)=374]
Trinary Explicit Sets	
E9{defer,Alow,Clow }	**Attraction Structure:** [PRE(LoMed)>PRE(LoHi)>1|PRE(MedHi)<1] [PRE(deferA$low)=300>PRE(deferC$low)=249>1|PRE(A$lowC$low)=.66<1]
E10{defer,Alow,Chi }	**Polarization Structure:** [1<PRE(LoMed)<PRE(LoHi)|PRE(MedHi)>1] [1<PRE(deferA$low)=300<PRE(deferC$hi)=374|PRE(A$lowC$hi)=1.50>1]

Manipulation of the within-set relative value structure: Construction of the PRE-structural configuration. In all conditions, the evaluation sets' PRE(LoHi)'s, PRE(LoMed)'s, and PRE(MedHi)'s, were diagnostic. That is, all proportional rates of exchange differed from unity: PRE≠1.

Explicit binary sets. Each PRE(LoHi) indicated similar magnitudes of increasing relative value: PRE(deferA$low) = 300, PRE(deferC$low) = 249, and PRE(deferC$hi) = 374. Note that, A$hi and C$hi are again on the same absolute value vector, ValueA$hi(0) = ValueC$hi(0) = 374. From the sellers' perspective, A$hi's and C$hi's value vector has the left-most position, and, therefore, the highest absolute value, while the other two computers are located on slightly lower absolute value vectors, ValueA$low(0) = 300, ValueC$low = 249. Note these relationships are exactly reversed when the same computers are in the aversive region as per the buyers' perspective.

Explicit trinary sets. In the trinary choice set condition, respondents deciding whether to sell a computer from S4{defer,Alow,Clow} had attraction-type evaluation set {E9} while those deciding whether to sell from S5{defer, Alow,Chi} had polarization-type evaluation set {E10}.

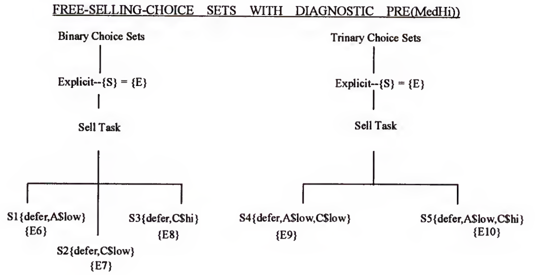


Figure 5-2. Design of the composition of choice {S} and evaluation {E} sets within the free-selling-choice condition. Table 5-2 shows the specific structure for evaluation sets {E6} to {E10}.

Predictions of Choice Patterns

Binary explicit choice sets. Figure 5-2 shows the "sell zone" predicted by our decision rule for binary evaluation sets wherein each brand's relative value was assessed in isolation: choose the proactive response if PRE(LoHi) ≥ 1. Since all the brands were located in the sell zone, each should appear attractive to a significant majority of respondents. Consequently, all else equal, we should obtain the expected asymmetric buying-selling behavior:

(P.5.18) $V_{A\$low,C\$low,C\$hi} = 0$

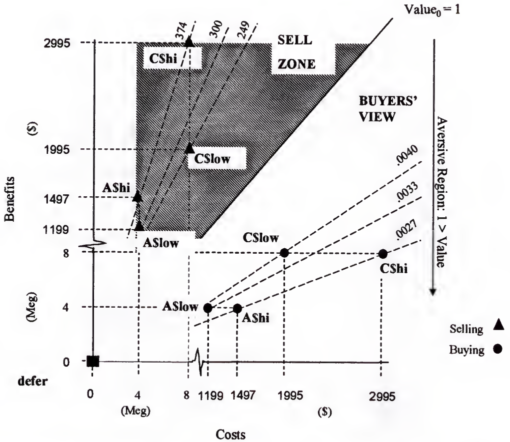


Figure 5-3. Sell Zone for four computers located in the attractive region where Value > 1.

Trinary explicit choice sets. Figure 5-4 shows the sell choice-zone created when A$low is owned along with one of the higher-benefit computers. Due to the decision-space inversion the following occurs. (a) An attraction-type PRE-structural configuration that enhances the likelihood

that A$low is bought (evaluation set {E5} in Table 4-2, Chapter 4) will appear to the sellers as a polarization-type PRE-structural configuration. This configuration enhances the likelihood that C$hi is sold from selling set S5{defer,Alow,Chi} (evaluation set {E10} in Table 5-2). (b) A polarization-type PRE-structural configuration that enhances the likelihood that C$low is bought (evaluation set {E4} in Table 4-2) will appear to the seller as an attraction-type PRE-structural configuration. This configuration enhances the likelihood that A$low is sold from selling set S4{defer,Alow,Clow} (evaluation set {E9} in Table 5-2).

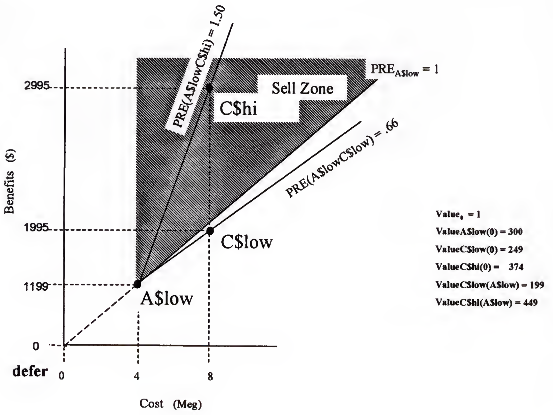


Figure 5-4. Sell choice-zone created when A$low is owned and it holds the intermediate benefit-position.

The implication is that the computers that sellers will want to keep are the computers that buyers will want to buy when they have the same level of product-decision urgency and their

respective evaluation sets' PRE-structural configurations are controlled and diagnostic across transaction perspective. Thus, the predictions are:

(P.5.19) $$\left[\frac{P(sellA\$low_{\$xA\$low}|defer\text{:}\,keep_{A\$low})}{P(sellC\$low_{\$xC\$low}|defer\text{:}\,keep_{C\$low})}\right]\approx 1<\left[\frac{P(sellA\$low_{\$xA\$low}|defer\text{:}\,keep_{Both,\,C\$low})}{P(sellC\$low_{\$xC\$low}|defer\text{:}\,keep_{Both,\,A\$low})}\right],$$

(P.5.20) $$\left[\frac{P(sellA\$low_{\$xA\$low}\,|\,defer:keep_{A\$low})}{P(sellC\$hi_{\$xC\$hi}\,|\,defer:keep_{C\$hi})}\right]\approx 1>\left[\frac{P(sellA\$low_{\$xA\$low}\,|\,defer:keep_{Both,\,C\$hi})}{P(sellC\$hi_{\$xC\$hi}\,|\,defer:keep_{Both,\,A\$low})}\right],$$

(P.5.21) $$\left[\frac{P(sellA\$low|defer\text{:}\,keep_{A\$low\&\,C\$low,\,C\$hi})}{P(sellC\$low,C\$hi|defer\text{:}\,keep_{C\$low,\,C\$hi\&\,A\$low})}\right]\approx 1,$$

(P.5.22) $$\left[\frac{P(buyA\$low\$X_{A\$low}|defer\text{:}\,keep\$x_{A\$low})}{P(buyC\$low_{\$xC\$low}|defer\text{:}\,keep\$x_{C\$low})}\right]\approx 1>\left[\frac{P(buyA\$low_{\$xA\$low}|defer\text{:}\,keep\$x_{A\$low,\,C\$low})}{P(buyC\$low_{\$xC\$low}|defer\text{:}\,keep\$x_{A\$low,\,C\$low})}\right],$$

(P.5.23) $$\left[\frac{P(buyA\$low_{\$xA\$low}\,|\,defer:keep\$x_{A\$low})}{P(buyC\$hi_{\$xC\$hi}\,|\,defer:keep\$x_{C\$hi})}\right]\approx 1<\left[\frac{P(buyA\$low_{\$xA\$low}\,|\,defer:keep\$x_{A\$low,\,C\$hi})}{P(buyC\$hi_{\$xC\$hi}\,|\,defer:keep\$x_{A\$low,\,C\$hi})}\right],$$

(P.5.24) $$\left[\frac{P(buyA\$low|defer\text{:}\,keep\$x_{A\$low,\,C\$low,\,orC\$hi})}{P(buyC\$low,C\$hi|defer\text{:}\,keep\$x_{C\$low,\,orC\$hi,\,A\$low})}\right]\approx 1,$$

(P.5.25) $V_{A\$low|C\$low\text{ or }C\$hi}\approx 0$.

Obtaining these results would suggest a symmetric valuation process that utilizes value relativity to guide choice across buying and selling transactions.

Results

Binary Free-Choice Sets

Table 5-3 shows the results of the binary selling and buying conditions.[3] There were no significant differences in the proportion of respondents who sold Alow, Clow, or C$hi in the binary sets. A significant majority sold the "owned" computer: .92 ($Z_{H0:>.5} = 12.29$, $P < .0001$).

3 The results of the buying sets were previously reported in Chapter 4, Table 4-3.

As predicted (P.5.2), this was not significantly different from the proportion of buyers (.86) deciding not to buy one of the same three computers from binary explicit sets (Z = 1.05, p = .29). Thus, there is a strong suggestion that the majority of both buyers and sellers felt the price was higher than the computers merited, i.e., WTS ≥ 0 and WTB < 0. Another way to see their valuation agreement is to realize that similar proportions of buyers who bought (.14) and sellers who did not sell (.08) gave preference to the product-benefits over the flexible-money-asset. Hence, as expected relative-value prediction P.5.17 was supported.

Table 5-3. Results of selling and buying binary-explicit free-choice set conditions with diagnostic PRE-structural configurations showing a "reversed" endowment effect.

Evaluation Set	Binary–Explicit Selling Choice Set	N	Defer Keep Computer	Aggregate Sell	Sell A$low	Sell C$low	Sell C$hi
{E6}	S1{defer,A$low}	32	.09		.91		
{E7}	S2{defer,C$low}	15	.00			1.00	
{E8}	S3{defer,C$hi}	16	.13				.87
	Selling Totals	63	.08	.92			
	Buying Choice Set		**Defer Keep $x**	**Aggregate Buy**	**Buy A$low**	**Buy C$low**	**Buy C$hi**
{E1}	S1{defer,A$low}	25	.88		.12		
{E2}	S2{defer,C$low}	16	.81			.19	
{E3}	S3{defer,C$hi}	16	.87				.13
	Buying Totals	57	.86	.14			

Trinary Free-Choice Sets

Table 5-4 shows the results of the trinary free-choice conditions. As was true in the buying condition, the sets' PRE-structural configurations had a significant impact on the computer that was chosen to be sold across sets (Z = 2.6, p < .01). When the evaluation set was {E9}, the PRE-structure indicated that selling A$low and keeping C$low was the better decision. In this condition, 65% of the respondents opted to keep high-priced C$low, even though they incurred a substantial loss of revenue by selling A$low instead. A$low's normalized sell rate was .69 instead of the .5 rate expected in the trinary context under the IIA assumption. When the evaluation set was {E10},

the PRE-structure indicated that selling C$hi was the better decision. Hence, 65% of respondents kept low-benefit A$low, even though they incurred a substantial loss in product-benefits by not keeping C$hi. A$low's normalized sell rate was only .35 instead of the .5 rate expected in the trinary context under the IIA assumption. Only relative value theory was able to predict this interaction effect ($\chi^2_{(1)} = 3.9$, $p < .05$) of competitive context. Therefore, predictions P.5.19, P.5.20, from relative value, P.5.9, from the economic perspective, and P.5.12, from loss aversion were supported. However, loss-aversion prediction P.5.13 and competing-economic-predictions P.5.3, P.5.4, and P.5.8 were not supported.

Table 5-4. Results of selling trinary-explicit free-choice sets condition with diagnostic PRE-structural configurations.

Evaluation Set	Trinary—Explicit Sets Selling Choice Sets	N	Keep One	Defer Keep Both	Aggregate Sell One	Sell A$low	Sell C$low	Sell C$hi
{E9}	S9{defer,Alow,Clow}			.06				
	Keep A$low		.29			.65		
	Keep C$low		.65				.29	
	Set Totals	17	.94	.06	.94			
{E10}	S10{defer,Alow,Chi}			.00				
	Keep A$low		.65			.35		
	Keep C$hi		.35					.65
	Set Totals	17	1.00	.00	1.00			
	Condition Totals	34	.97	.03	.97			
	Buying Choice Sets		**Defer Keep $x**	**Defer Buy None**	**Aggregate Buy One**	**Buy A$low**	**Buy C$low**	**Buy C$hi**
{E4}	S4{defer,Alow,Clow}			.17				
	Defer buying A$low		.71			.12		
	Defer buying C$low		.12				.71	
	Set Totals	17	.83	.17	.83			
{E5}	S5{defer,Alow,Chi}							
	Defer buying A$low		.25			.69		
	Defer buying C$hi		.69					.25
	Set Totals	16	.94	.06	.94			
	Condition Totals	33	.88	.12	.88			

For buying evaluation set {E4}, the PRE-structure indicated buying C$low was the better decision and 71% of buyers chose C$low over A$low. Hence, only relative-value prediction P.5.22

was supported. Contrary to the selling condition, neither economic predictions P.5.5, P.5.10, nor loss-aversion prediction P.5.14 was supported.

In contrast, in buying evaluation set {E5}, the PRE-structure indicated buying A$low was the better decision and 69% of buyers chose A$low over C$hi. Relative-value prediction P.5.23 and economic prediction P.5.11 were supported. Contrary to the selling condition, neither economic prediction P.5.6 nor loss-aversion prediction P.5.15 was supported.

In addition, note the split experimental design wherein C$low's relative value is as proportionately higher than that of A$low, as A$low's relative value is proportionately higher than that of C$hi, i.e., PRE(A$lowC$low) = PRE(A$lowC$hi)$^{-1}$. The planned significant interaction effects of competitive context (see above) and the non-significant main effect of benefit level (relative-value predictions P.5.21 and P.5.24) were obtained in both buying and selling contexts.

Another indication of respondents' use of the PRE-structure to guide their choices was the parallel between the symmetry in their decisions and the reciprocal nature of trinary sets' structural configurations. (a) Owners (65%) kept C$low from $\{S4\}_{sell}$ while buyers (71%) acquired C$low to a similar degree from $\{S4\}_{buy}$ when the PRE-structure enhanced its relative value due to A$low's presence. (b) Analogously, owners (.65) kept A$low from $\{S5\}_{sell}$ while an equivalent proportion of buyers (.69) acquired A$low from $\{S5\}_{buy}$ when the reciprocal PRE-structure enhanced its relative value due to C$hi's presence. (c) Thus, a significantly larger proportion (.44) of owners and buyers chose, respectively, to keep or acquire A$low when its competitive context was C$hi (.67) than when it was C$low (.23; $Z = 4.03$, $p < .001$). (d) In a like manner, when A$low was the competitor, a significantly larger proportion (.38) of owners and buyers chose to keep or acquire C$low (.68) than those keeping of acquiring C$hi (.30; $Z = 3.35$, $p < .01$). This symmetry is the more remarkable in light of respondents' choice behavior when selling or buying the same options from binary explicit sets (refer to Table 5-3). For example, the majority of owners or buyers similarly disdained to keep or acquire C$low (.10) or C$hi (.13) when the computers were evaluated without knowledge of A$low.

Importantly, then, the loss-aversion-based hypothesis of differential valuation strategies for buyers and sellers (loss- aversion predictions P.5.16: reversed-endowment, and P.5.17: endowment) was not supported. Instead, the hypothesis of analogous valuation strategies for buyers and sellers, implied by both relative value theory (relative-value prediction P.5.25) and the Coase theorem (economic-prediction P.5.7), was supported.

Furthermore, note that there was no significant difference in the proportion opting for the status quo (defer option) across binary and trinary selling choice-sets: .08 vs. .03, respectively. Hence, the choice of which computer to sell in the trinary set condition could be "modeled" via a hierarchical decision-process scheme as is typically done to avert problems with violations of the IIA property due to the similarity effect in buying choice sets. This result is opposite to that obtained in the buying free-choice sets presented in Chapter 4, wherein the choice behavior could not be modeled via a hierarchical decision process. This result reiterates my former contention that the revealed product-preference axiom could not be falsified unless "aversive" appearing options were used to test the axiom's validity.

As reviewed above, only relative value theory was able to account for these data patterns in their entirety. Specifically, note that relative value theory was able to reconcile the assertion by behavioral researchers that product-preferences are constructed during a choice event and the economic perspective's allegation that preferences are stable across choice events. In conclusion, product-choice is better viewed as representing "revealed PRE-structural-relationships-preference" instead of representing "revealed product-preference" as has been advocated previously.

Summary

The findings of the selling experiment reported in this chapter replicated the evidence presented in Chapter 4 of respondents' use of evaluation sets' PRE-structural configurations to guide their choices. They also serve to extend the scope of the explanatory power of relative value theory to the selling context. However, there is an important implication of relative value theory

that was only hinted at in Chapter 4: the differential impact of situational variables such as choice set format (free choice versus forced-choice) have on respondents' use of the relative value structure to guide their choices. This issue is examined in the next chapter.

CHAPTER 6
FORCED-CHOICE VERSUS FREE-CHOICE WHEN THE PROPORTIONAL RATE OF EXCHANGE STRUCTURAL CONFIGURATION IS NON-DIAGNOSTIC

Overview

Relative value theory asserts the goal of a decision event forms an evaluative framework that determines the relevancy, the importance, and the valence of the decision elements that constitute the inputs to the decision-making process. Moreover, decision-makers are assumed to utilize any available information deemed to be relevant to the choice task during a decision event.

According to Beach and Mitchell (1987a, b) a free-choice context fosters a "wait-and-see" attitude because there is a higher degree of ambiguity than in forced-choice situations wherein decision-makers are compelled to take a proactive stance. To the extent that these two decision contexts affect decision-makers' interpretation of the goal of a decision event, they will have an impact on choice.

For example, due to the high product-decision-urgency implied by forced-choice context, this choice format may foster a proactive attitude that could induce buyers and sellers to more aggressively focus on the maximization of their opposite transaction benefits. Thus, sellers would give greater weight to the maximization of revenue and less weight to the cost of replacement of the working asset. In that case they may have a higher tendency to prefer to keep a lower quality asset and dispose of a higher quality one that generates higher revenue. Conversely, buyers might give even greater weight to the maximization of product-benefits. Thus, buyers could then have a higher tendency to prefer to buy high quality even when it represents a substantial price increase. That is, sellers should want to sell C$hi and buyers should also desire to buy C$hi from {A$hi,C$hi}.

In an opposite manner, the conservative attitude fostered by the defer-choice situation could motivate buyers and sellers to place a higher focus on the minimization of their opposite

transaction costs. That is, sellers would try to minimize giving up their asset-benefits giving greater weight to replacement costs; buyers would try to minimize expenditures of money . As a result, buyers should prefer to buy at a low price even when doing so would represents a considerable loss in quality. Sellers should prefer to keep a higher quality asset even when keeping it represents a considerable revenue loss.

As was shown in Chapter 4, however, respondents have an even stronger response to a diagnostic PRE(MedHi) in a forced choice context than in a defer-choice context. Thus, any effect on choice directly due to the context environment itself would be swamped by the stronger effect of the PRE-structure. By allowing the researcher to control the respondents' evaluation set's structure, relative value theory may be used to study more subtle effects such as the hypothesized effect of the choice set format. For example, in the present case, the proportional rate of exchange for the high benefit-sector can be constrained to PRE(MedHi) = 1. By equating the relative value of the high-benefit brand to that of the low-benefit brand, the effect of choice set format will have a strong enough impact on choice to allow its measurement.

Note that neither traditional economic theory nor loss aversion bespeaks to the effect of choice set format on choice. Hence, predictions that could be derived from either the economic perspective or loss aversion would be equal to those enumerated in Chapter 5 for sets having as competitors A$low and either C$low or C$hi. Moreover, the Coase theorem also takes into consideration neither the effect of choice format nor the effect of competitors' relative value structural configuration. Accordingly, it again would predict similar no effect of transaction perspective on the valuation of A$hi or C$hi—$V_{A\$Hi} \approx V_{C\$Hi} \approx 0$ (refer to Equation 5.1 in Chapter 5) for both forced-choice and free-choice sets.

For competitive buying and selling sets with A$low and either C$low or C$hi, predictions derived under relative value theory were in agreement with the Coase theorem on the valuation of direct competitors due to the diagnosticity of the sets' relative value structural configurations. Since that decision factor is rendered nondiagnostic in sets having A$hi and C$hi as competitors, relative value theory predicts an effect of choice context (free-choice vs. forced-choice) on the

decision to sell or buy one of the two computers rather than on the decision-makers' valuation of the products. The insight on the impact choice-set type would have on choice is due precisely to relative value theory's assertion that the valuation process is constant. Thus, given the discussion above, relative value predicts an interaction effect on V between choice context (free-choice vs. forced-choice) and option type (low-benefit, low-cost vs. high-benefit, high-cost): free-choice: $V_{A\$Hi} > 0$, $V_{C\$Hi} < 0$; forced-choice: $V_{A\$Hi} < 0$, $V_{C\$Hi} > 0$.

Experimental Setting

Manipulation of the evaluation sets

The evaluation sets' PRE-Structural Configurations, {E}, are shown in Table 6-1. Figure 6-2 shows a schematic diagram of the tests to be reported in this chapter. Only two computers were used, A$hi and C$hi, across buying and selling transactions. These options can be seen in Figure 5-1, Chapter 5 from the perspective of buyers and sellers. Note that they are on the same value vector in either the attractive region for the sellers, or the aversive region for the buyers.

Table 6-1. Evaluation sets' within-set relative value structure for buying choice sets shown in Figure 6-1.

<table>
<tr><th>Evaluation Set</th><th>PRE-Structural Configuration</th></tr>
<tr><td>Selling</td><td></td></tr>
<tr><td>Binary Set</td><td></td></tr>
<tr><td>E8{defer,A$hi or C$hi}</td><td>[[PRE$_{\infty}$=1<PRE(LoHi)]=[PRE$_{\infty}$=1<PRE(defer A$hi or C$hi)=374]</td></tr>
<tr><td>Trinary Set</td><td></td></tr>
<tr><td>E11(defer,Ahi,Chi}</td><td>[1<PRE(LoMed)=PRE(LoHi)|PRE(MedHi)=1]
[1<PRE(deferA$hi)=374=PRE(deferC$hi)=374|PRE(A$lowC$hi)=1=1]</td></tr>
<tr><td>Buying</td><td></td></tr>
<tr><td>Binary Set</td><td></td></tr>
<tr><td>E3{defer,A$hi or C$hi}</td><td>[[PRE$_{\infty}$=1>PRE(LoHi)]=[PRE$_{\infty}$=1>PRE(defer A$hi or C$hi)=.0027]</td></tr>
<tr><td>Trinary Set</td><td></td></tr>
<tr><td>E12(defer,Ahi,Chi}</td><td>[1>PRE(LoMed)=PRE(LoHi)|PRE(MedHi)=1]
[1>PRE(deferA$hi)=.0027=PRE(deferC$hi)=.0027|PRE(A$lowC$hi)=1=1]</td></tr>
</table>

CHOICE SETS WITH PRE(LoHi) ≠ 1 & PRE(MedHi) = 1

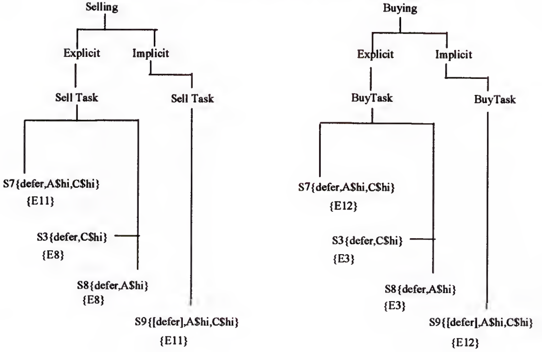


Figure 6-1. Design for testing the effect of choice set format across buying and selling transactions.

Manipulation of the decision-urgency across selling and buying conditions

Respondents in the selling condition read either the selling-high-decision-urgency or the selling-intermediate-decision urgency context paragraphs shown in Table 5-1, in Chapter 5. Respondents in the buying condition read either the buying-high-decision-urgency or the buying-intermediate-decision-urgency paragraphs shown in Table 4-1, in Chapter 4.

Predicted impact of decision context across selling and buying conditions

In the buying condition's context paragraph (Table 4-1, in Chapter 4), respondents are explicitly told the equipment they need to obtain, are implicitly "endowed" with the funds to purchase their chosen option, and are given an ambiguous reason for the transaction, ". . . need it for your work. . . ." In the selling condition context paragraph (Table 5-1, in Chapter 5),

respondents are explicitly "endowed" with one or two computers and are explicitly told they lack funds to accomplish some ambiguous goal ". . . raise funds to buy some other equipment that you need for your work . . ."

In either case, respondents need to consider decision elements that are exogenous to the concrete context. For example, sellers might ponder about the type of work they need to do, how badly strapped for money they really are, what type of equipment is it and how much could it cost, etc. Thus, they need to balance their ambiguous need to secure cash against their ambiguous need for equipment to ensure a good job performance. All else equal, the higher their felt need for cash, the higher their tendency to maximize the acquisition of needed-assets in exchange for owned-assets--i.e., selling of the high-benefit option should rise; decreased levels of perceived decision-urgency foster their tendency to conserve owned-assets--i.e., selling of the low-benefit option should rise.

In contrast, the buyers know they must buy, but they are not sure what needs to be accomplished or the extent of their budget, etc. Thus, their task is more focused toward the acquisition of assets than that of the sellers. However, all else equal, there is a monotonic relationship between perceived urgency for the equipment and maximization of the acquisition of needed-assets in exchange for owned-assets. Thus, under high urgency buying of the high-benefit option should rise. Under low urgency, currently owned-assets are conserved and the buying of the low-benefit option rises.

When seen in isolation, A$hi and C$hi will appear as "poor buys" from the buyers' perspective in {E3: PRE(LoHi) < 1} (see Table 6-1 and Figure 5-1 in Chapter 5), and good "sales" from the sellers' perspective in {E8: PRE(LoHi) > 1}. However, when A$hi is either known or owned, it is the intermediate-benefit option that sets up the choice zone in the aversive region or the sell zone in the attractive region: i.e., at $PRE_{A\$hi} = 1$. Since PRE(LoMed) = PRE(AhiChi) = 1, both computers would be on the right-most boundary of the choice zones, either sell or buy. Thus, when evaluated in an extended, trinary evaluation set, they would both now be at least "acceptable"

options to sell or to buy. This is why we will be able to test the hypothesized effect of choice set format.

As we saw in Chapters 4 and 5, respondents use the information in the entire evaluation set embodied by the PRE-structural configuration to guide their choice when the choice sets were of the free-choice type. However, in a forced-choice format, PRE(MedHi), indicating the direct proportional tradeoff across the coveted high benefit-sector brands, becomes more salient. All else equal, this results in PRE(MedHi) having a stronger impact in forced-choice sets.[1] This supremacy of PRE(MedHi) was also demonstrated on its strong effect on the choice of A$low from forced-choice set S6{Alow,Chi|{defer]}, with attraction-type PRE-structure {E5} (see Tables 4-2 and 4-3 in Chapter 4).

Options A$hi and C$hi are balanced in terms of PRE-units, i.e., PRE(MedHi) = 1. As a result, respondents "buying" from free-choice sets with trinary evaluation set {E12:PRE(LoHi) < 1} (see Figure 6-1 and Table 6-1) will feel all choices are "poor" neither has a decided relative value advantage. But, given the need to buy, they will "compromise" by taking the "lesser of two evils," and choose A$hi. In the forced-choice format, the implicit assumption is of a great urgency for the benefits to be gained by the purchase. Hence, the most salient information is PRE(MedHi). Given that C$hi is at least "as good" in terms of relative value as the less powerful A$hi. Thus, respondents will tend to polarize and choose C$hi.[2] The same evaluation process will occur in the selling condition. Respondents "selling" from free-choice set with trinary evaluation sets {E11: PRE(LoHi) > 1} should tend to "compromise" and sell A$hi. Respondents selling from a forced-choice set should tend to polarize and sell C$hi. Moreover, by the region effect (see Chapter 3), the tendency to polarize should be stronger in the selling set because it is located in the attractive

[1] Recall this effect was demonstrated by the meta-analysis of trinary forced-choice sets presented by Hollman and Lynch (1997) and reviewed in Chapter 3.

[2] Recall from Chapter 3, that Hollman and Lynch (1997) found a significant tendency to choose the high-benefit brand irrespective of region from forced-choice buying sets when PRE(AC) = 1.

region were Value > 1, than in the buying set because it is located in the aversive region were Value < 1.

Results

Binary-explicit free-choice sets across selling and buying transactions

Table 6-2. Results of selling or buying free-choice condition with PRE(LoHi) ≠ 1.

Explicit Evaluation Set	Binary Free-Choice	N	Defer Keep One	Aggregate Sell	Sell A$hi	Sell C$hi
	Selling					
{E8}	S7{defer,A$hi}	17	.06		.94	
{E8}	S3{defer,C$hi}	16	.13			.87
	Condition Totals	33	.09	.91		
	Buying	**N**	**Aggregate Buy**	**Defer**	**Buy A$hi**	**Buy C$hi**
{E3}	S8{defer,A$hi}	11		.73	.27	
{E3}	S3{defer,C$hi}	16		.87		.13
	Condition Totals	27	.19	.81		

Table 6-2 shows the results of the binary-explicit selling and buying free-choice sets. Recall that the evaluation set of A$hi and C$hi are identical in terms of absolute value and of PRE(LoHi) within buying or selling transaction, and similar to the corresponding evaluation sets of A$low and C$low as reported in Chapters 4 and 5. The difference in the proportion of respondents who sold A$hi (.94) or C$hi (.87) was not significant. In addition, these proportions also did not differ from those selling A$low or C$low as reported in Chapter 5 (Table 5-3). Thus, A$hi was as attractive a "sell" option as any of the other computers. In the buying transaction condition, there was also no significant difference in the proportion buying A$hi (P(A$hi|defer) = .27) and that of the other three computers. Thus, A$hi was as aversive a "buy" as Alow, Clow, or C$hi in their choice sets. Again, it appears that a clear majority of both buyers and sellers coincided in their valuation of the computers as "overpriced" ($Value_{buy} < 1$, $Value_{sell} > 1$).

Table 6-3. Results of selling trinary-explicit free-choice sets condition with PRE(Med) = 1.

Trinary Evaluation Set Explicit	Trinary Free-Choice	N	Keep One	Defer Keep Both	Aggregate Sell	Sell A$hi	Sell C$hi
	Selling						
{E11}	S9{defer,Ahi,Chi}	13		.08	.92		
	Keep A$hi		.23			.69	
	Keep C$hi		.69				.23
			.92	.08			
	Buying	**N**	**Aggregate Buy**	**Defer Buy Neither**		**Buy A$hi**	**Buy C$hi**
{E12}	S7{defer,Ahi,Chi}	18	.77	.23		.72	.05
Trinary Evaluation Set * Implicit	**Binary Forced-Choice**	**N**	**Keep One**	**Defer Keep Both**	**Aggregate Sell**	**Sell A$hi**	**Sell C$hi**
	Selling						
{E11}	S9{Ahi,Chi|[defer]}	17		N/A	1.00		
	Keep A$hi		.76			.24	
	Keep C$hi		.24				.76
			1.00				
	Buying	**N**	**Aggregate Buy**	**Defer Buy Neither**		**Buy A$hi**	**Buy C$hi**
{E12}	S9{Ahi,Chi|[defer]}	17	1.00	N/A		.53	.47

Sets with trinary evaluation sets across buying and selling transactions

Table 6-3 shows the results of the trinary free-selling-choice condition. The expected interaction of choice context (free-choice vs. forced-choice) and option type (low-benefit, low-cost vs. high-benefit, high-cost on the computer that was chosen to be sold ($\chi^2 = 7.6$, $p < .01$) or to be bought ($\chi^2 = 10.5$, $p = .001$) across sets. Note the "typical" attraction choice pattern exhibited in buying set S7{defer,Ahi,Chi}. In the binary-explicit condition, the aggregate share (.81) for defer was significantly above chance level ($p < .01$). This share level decreased significantly (.58), while the shares of A$hi increased (.45) significantly when both A$hi and C$hi coincided in free-choice set {S7} ($p < .01$). In the forced-choice condition, however, high-benefit C$hi draws shares

from A$hi due to the proactive attitude fostered by the high-decision urgency implied by the forced-choice format. The exactly opposite result was obtained in the selling condition across free-choice and forced-choice formats.

Results reported in Chapter 4 and Chapter 5 demonstrated that, when they chose from sets with fully diagnostic PRE-structures, buyers and sellers coincided on the computer to buy or keep, respectively (i.e., $V_{\text{all brands}} \approx 0$). In contrast, when the PRE-structure was nondiagnostic as in the present study, sellers and buyers did not agree on which computer to keep or buy, respectively. Across choice-set types, the computer that sellers wanted to sell was the computer that buyers wanted to buy. Thus, the predicted cross-over interaction was obtained: free-choice: $V_{A\$Hi} = .49$, $V_{C\$Hi} = -.64$; forced-choice: $V_{A\$Hi} = -.23$, $V_{C\$Hi} = .23$ ($p < .01$).

The expected significant effect of region is evident in the in the forced-choice condition. The owners' desire to sell C$hi (.76) was significantly greater than the buyers' desire to acquire C$hi (.47) ($p < .05$).

Summary

The findings that were reported in this chapter replicated the evidence that was presented in Chapters 4 and 5. In addition, the choice patterns reported here could not be explained in their entirety by any extant theory other than by relative value theory. Respondents used the evaluation sets' PRE-structural configurations to guide their choices. When this information is nondiagnostic, they rely more specifically on other decision variables to arrive at their best choice given their state of knowledge and their available options.

Further, it was shown respondents'' evaluation sets' structural components could be successfully controlled by manipulating the options' PRE relationships. In this manner, it was possible to successfully test the more subtle effect of choice-set type on the decision to sell or to buy. Consequently, relative value theory may prove to be an effective instrument in the study of other subtle decision variables that, nevertheless, have important marketing implications.

CHAPTER 7
GENERAL DISCUSSION AND CONCLUSIONS

Compatibility Between the Postulated Existence of a Stable Preference Construction Process and the Empirically Observed Choice Heterogeneity Across Decision-Makers or Across Decision Events

The Role of the Evaluation Set on the Elicitation of Heterogeneous Choice

Antecedents to preference heterogeneity

Effect of input variability. For choice to be predictable, it must result from a stable process that deals with variable stimuli in consistent and lawful ways. In agreement with current decision research, relative value theory postulates decision-makers construct their preferences at the time of choice. In contrast to current decision research, relative value theory postulates a stable preference construction process as shown in Figure 7-1 and representing a more detailed expansion of Figure 3-1 in Chapter 3.

Although the preference construction process is consistent, preference heterogeneity may result across decision-makers during a common decision event or within a decision-maker across decision events. Such choice heterogeneity results from the variability of the preference construction process' direct inputs or from the variability of intervening variables such as the decision goal or the degree of perceived decision urgency.

Types of inputs. Inputs to the preference construction process can be stimulus-based, memory-based, or mixed (see Lynch and Srull, 1982). Unlike a stimulus-based choice context in which all relevant benefit and cost information is physically present during the choice event, some decision-relevant data must be accessed from memory in a mixed decision context. Alba, Hutchinson, and Lynch (1991) speculated that memory factors would play a crucial role in

consumer choice. They also contended that very few market-place decisions are purely stimulus-based. Consequently, they proceeded to call for greater research into the role of memory on choice. However, with the sole exception of Simonson and Tversky's (1992; Tversky and Simonson, 1993) work on background contrast effects in binary forced-choice contexts, no research prior to this dissertation has specifically investigated the effect of memory on choice when the remembered product is not part of the consideration or choice set.

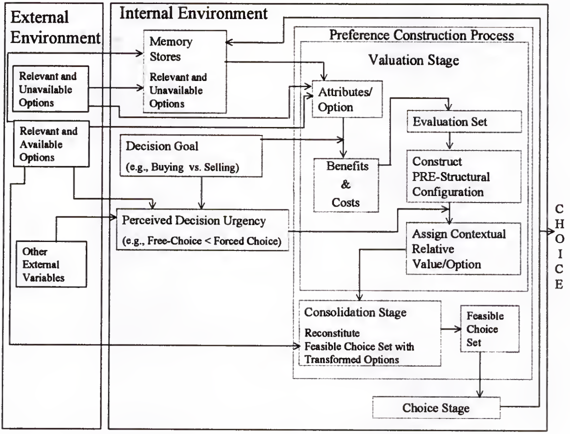


Figure 7-1. Originally shown in Figure 3-1, the discrete decision context is shown in an expanded form here to illustrate details of the postulated constant preference construction process, its variable inputs, and intervening variables—the decision goal and the degree of perceived decision urgency.

Importance of the evaluative framework set up by the decision goal. In Chapter 3, I specified that the choice process was comprised of different stages. As shown in Figure 7-1,

relevant and available attribute data are gathered from the external environment—e.g., the choice set—or from memory during the valuation stage. Note that the process of transforming these data into each known option's benefits and costs is under the direct influence of the evaluative framework set up by the decision goal.

The end result of this step is that the evaluation set comprises the benefits and costs associated with all options taken into account by decision-makers for the purpose of estimating the relative value of the feasible choice options available to them. Consequently, the evaluation and choice sets may differ across decision-makers or across decision events.

Effect of PRE-structure on preference formation

PRE-structure formation across online and mixed choice contexts. I also stipulated that decision-makers used the PRE-structural configuration of the elements comprising the evaluation set to construct a preference ranking of their feasible options. Using a buying context, the foregoing premises were tested directly in the experiment reported in Chapter 4.

As predicted by relative value theory, the likelihood that an option was selected from the feasible choice set depended on its evaluation set's PRE-structural configuration irrespective of the immediate availability of the options constituting the evaluation set. That is, a currently available target brand's likelihood of choice was affected in a predictable manner by the interrelationship of its benefits and costs with those of a competitor brand. This result held whether information on the competitor's benefits and costs was available online (stimulus-based choice context) or had to be retrieved from memory (mixed choice context).

Ascendancy of evaluation set over the feasible choice set in the elicitation of choice heterogeneity

Lower-tier target brand and higher-tier competitors. Figure 7-2 shows the evaluation set's significant effect on the preference for the lower-tier target brand, A$low. Note that the "online" information available to respondents in the No-Competitor and Memory conditions was constant—choice set S{defer,A$low}. However, A$low's evaluation set was hypothesized to change across those two conditions. In the No-Competitor condition, the feasible choice set and the evaluation set

were expected to coincide due to the lack of competitor information. Hence, all information available was online, i.e. S{defer,A$low} = E{defer,A$low}. In the Memory condition, respondents had been exposed to one of two higher-tier competitors, C$low or C$hi, prior to choosing from S{defer,A$low}. Thus, respondents' evaluation sets consisted of "mixed" information: online information about the lower-tier target, A$low, and memory information about higher-tier competitor C$low or C$hi. As a result, respondents' choice sets and evaluation sets were expected to differ depending to their prior exposure to C$low—S{defer,A$low} ≠ E{defer,A$low,[C$low]}—or to C$hi—S {defer,A$low} ≠ E{defer,A$low,[C$hi]}. In addition, the resultant PRE-structure for E{defer,A$low,[C$low]} was expected to disfavor A$low to the same extent that the PRE-structure for E{defer,A$low,[C$hi]} was expected to enhance A$low.

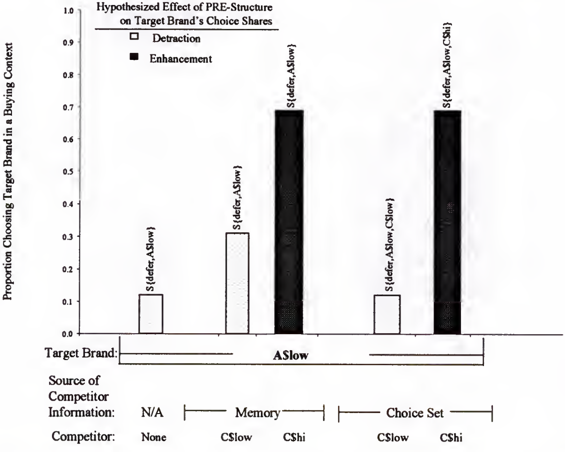


Figure 7-2. Ascendancy of the evaluation set's PRE structural configuration over the choice set on the preference for lower-tier brand A$low. (Refer to Chapter 4 for specific details.)

In the remaining two sets, A$low was paired with a higher-tier competitor, C$low or C$hi, and offered to respondents as a member of trinary choice set S{defer,Alow,Clow} or S{defer,Alow,Chi}. Therefore, respondents' respective evaluation sets were expected to be constructed from online information and to coincide with their corresponding choice sets—S{defer,Alow,Clow} = E{defer,Alow,Clow} and S{defer,Alow,Chi} = E{defer,Alow,Chi}. Because these two evaluation sets were equal to the corresponding mixed-information evaluation sets (E{defer,A$low,[C$low]} or E{defer,A$low,[C$hi]}), A$low's choice shares were expected to depend on the effective evaluation set and not on the feasible choice set.

Given the level of information provided to respondents, A$low was rejected by a significant majority when chosen in the No-Known-Competitor condition from a binary choice set, S{defer,A$low}, with a binary evaluation set, E{defer,A$low}. A$low continued to be significantly aversive to respondents when knowledge of a higher-tier brand, C$low, produced a PRE-structure that showed A$low to be a poor choice in relative value terms whether or not C$low was a feasible choice. In contrast, A$low was chosen by a significant majority of respondents when knowledge of a different higher-tier brand, C$hi, produced a PRE-structure that showed A$low to be a good choice in relative value terms whether or not C$hi was a feasible choice.

Higher-tier target brands and lower-tier competitor. The same significant effect of PRE-structure on the target's choice share is shown in Figure 7-3 for higher-tier target brand C$low or C$hi. The No-Known-Competitor condition for the higher-tier brands was like the one for the lower-tier brand. Thus, the feasible choice set and the evaluation set for C$low or C$hi were expected to coincide due to the lack of online or memory competitor information, i.e., S{defer,C$low} = E{defer,C$low} or S{defer,C$hi} = E{defer,C$hi}. Moreover, the choice shares for Alow, Clow, and C$hi were expected to not differ significantly in this condition because of the similar magnitudes of the evaluation sets' PRE-structures.

A very different prediction was made for C$low's choice shares versus those of C$hi in the Memory condition when each higher-tier brand's competitor was lower-tier brand A$low. The resultant "mixed" evaluation sets were composed of online information about a higher-tier brand,

C$low or C$hi and of memory information about the same low-tier brand, A$low. This resulted in non-matching evaluation and choice sets for both higher-tier brands: S{defer,C$low} ≠ E{defer,[A$low],C$low} or S{defer,C$hi} ≠ E{defer,[A$low],C$hi}. Furthermore, note the PRE-structure of E{defer,[A$low],C$low} enhanced C$low's relative value while that of E{defer,[A$low],C$hi} detracted from C$hi's relative value. Consequently, it was predicted that only C$low's choice shares would show a significant and positive effect of competitor knowledge across No-Known-Competitor and Memory conditions. The same predictions were made for the effect of the introduction of A$low into S{defer,C$low} or S{defer,C$hi} yielding "online" trinary evaluation sets corresponding to those of the Memory condition: E{defer,Alow,Clow} or E{defer,Alow,Chi}. Hence, the two higher-tier brands' choice shares were expected to depend on the effective evaluation sets and not on their feasible choice sets.

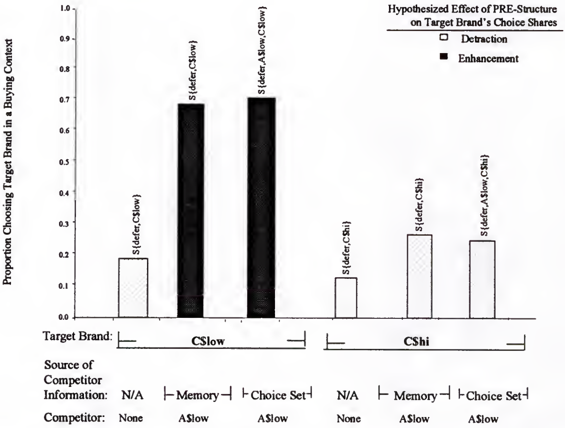


Figure 7-3. Ascendancy of the evaluation set's PRE structural configuration over the choice set on the preference for higher-tier brands C$low or C$hi. (Refer to Chapter 4 for specific details.)

Figure 7-3 illustrates the importance of an evaluation set's enhancing PRE-structure is as strong on a higher-tier brand's choice shares as it was shown to be for a lower-tier brand in Figure 7-2. Moreover, comparison of these two figures further illustrates the ascendancy of the composition of the evaluation set over the feasible choice set in the elicitation of choice heterogeneity. When the PRE-structures coincided, the target brands' choice shares also coincided irrespective of the composition of the feasible choice set, the tier level of the target brand, or the source of competitor information.

Implications for research on memory and decision making

Note the previous premises and supporting results are unlike conclusions reached by other researchers (e.g., see Alba et al., 1991) regarding the role of remembered information on choice. In relative value theory there is a clear separation between the feasible choice set and the evaluation set. The feasible choice set is the compendium of options that are available to the decision-maker to choose from. The evaluation set is the compendium of known options that is used to assess the relative value of the options comprising the feasible choice set. In this framework, memory would be expected to affect consumer choice in at least two ways.

One way memory affects choice is by influencing the composition of the feasible choice set as has been hypothesized in previous research (see Alba et al., 1991). This is an important role of memory. The composition of the choice set has long been recognized as an important determinant of choice (e.g., Hauser, 1978; Nedungadi, 1990). In addition, variability in choice set composition across decision events has been used to explain choice heterogeneity (e.g., Baker, Hutchinson, Moore, and Nedungadi, 1986; Hauser and Wernerfelt, 1990).

Another way memory affects choice heretofore has not been considered by behavioral researchers. It was also not speculated upon by Alba et al.'s (1991) cogent paper. As was demonstrated in Chapter 4 and clearly illustrated in Figures 7-2 and 7-3, memory can have a notable impact on feasible alternatives' likelihood's of choice by directly altering their evaluation set's PRE structural configuration without affecting the composition of the choice set under

consideration. Further research in this area would certainly expand our understanding of the role of memory in real-world consumer decision making.

On the other hand, incorporation of learning to the classical economic viewpoint does imply the role of memory elucidated in Chapter 4 (see Wernerfelt, 1995). However, as was discussed in that same chapter, the current conceptualization of how learning affects reservation threshold is too narrow to explain the complete results obtained in Chapter 4's buying experiment. In contrast, relative value theory was able to account for the data pattern in its entirety. Nonetheless, an important question advanced by Alba et al (p. 2, 1991) about the effect memory for past decisions may have during a current choice event has not been addressed by this research. Thus, the effect of past choices on the inputs to the preference construction process and on the decision goal remains to be investigated.

Implications for decision-making research methodology

Experimental behavioral research on choice has been criticized as lacking external validity. According to this argument, decisions in the marketplace are repetitive in nature, thus allowing learning to occur. Hence, context effects demonstrated through the use of between-subjects, "one-decision" experiments may not be representative of the decision processes used by decision-makers in the "real world." In response, there has been a movement toward providing respondents with a wide array of brand information or with practice in making within-category tradeoffs prior to participation in a focal experiment (e.g., Kahneman et al., 1990; Simonson and Tversky, 1992; Tversky and Shafir, 1992a).

The work presented here suggests that respondents form evaluation sets to construct their preferences prior to choice. As a result, the change in experimental methodology alluded to above may be problematic for the studies' internal validity. One way for decision researchers to infuse a measure of marketplace realism without diminishing internal validity is to control for evaluation sets' PRE-structures across conditions.

The Role of Decision Goal Variability on the Elicitation of Heterogeneous Choice

Goal-dependency of the assignation of benefit or cost status to decision attributes

Researchers propose decision-makers use a variety of decision-making strategies contingent on various characteristics of the decision event (e.g., Abelson and Levi, 1985; Bettman and Johnson, 1988; Bettman et al., 1993; Payne, 1982; Payne et al., 1992; Shafir, 1993; Shantaeau, 1988; Slovic et al., 1990; Tversky and Shafir, 1992a; Tversky et al., 1988; Westenberg and Koele, 1992). In this stream of research, decision-makers are viewed as having to maintain and to select from an array of combinatorial decision rules due to their limited processing capacity (Alba et al., 1991). There are tacit assumptions underlying such a view that have remained largely unexamined. One assumption is that decision-makers perform the complex processing involved in cost-benefit tradeoffs at an aware level thereby taxing their processing capabilities. Another assumption is that there is no "cost" to the decision-maker of maintaining arrays of decision strategies and contingency patterns nor of matching contingency patterns to decision strategies.

The limited-capacity argument may untenable. It seems more probable that the complex processing required in determining an option's relative value goes on below the level of conscious awareness. For example, the use of stimuli's rates of change and their acceleration are reported to be ubiquitous in animal decision making and to be fundamental to species survival (e.g., Gallistel, 1993; Camhi, 1984). Thus, to ascribe a similar ability to humans we only need to assume that humans have maintained the capability for abstracting such information from their environment and for processing it at an intuitive level. This would parallel the way humans have kept other complex information processing abilities shared with lower level animals. Moreover, current models of visual perception, numerical comparison, and learning in the fields of biological information processing and of neuropsychology are relational in nature. That is, the models incorporate the processing of attribute structural interrelationships and their higher level relationships to obtain inputs to behaviorally relevant decisions (e.g., Grossberg, 1987; Grsossberg

and Mingolla, 1986; Gallistel, 1993; Dehaene, 1989; Camhi, 1984). Relative value theory offers a similar approach to the modeling of the preference construction process.

The second tacit assumption mentioned above is open to the same criticism that has been leveled to the traditional economic assumption specifying decision-makers maintain a weakly ordered preference field. Edwards (1954) noted that maintaining such a "field" would be quite costly in effort (resulting in "negative" utility) and, thus, its maintenance would appear to attack the very "rationality" argument it is supposed to imply. In a similar vein, the costs of maintaining arrays of decision strategies and contingency patterns and of matching contingency patterns to decision strategies would be prohibitive.

The processing costs accompanying the matching step have been taken into consideration within a cost-benefit framework. For example, use of one decision rule over another is supposed to depend on the tradeoff of choice optimality (benefit to be maximized) and strategy-execution effort (cost to be minimized). However, the effort and time costs of making such a tradeoff prior to processing the decision elements has not been considered in this research. If as compensatory strategies are very effortful as Tversky and Shafir (1992a) have hypothesized, it seems implausible that decision-makers would invest is such expensive pre-processing costs in most situations.

The cost of maintaining the required arrays has also not been taken into consideration. A fundamental question that has not been asked is whether the proposed rules are learned or "hard-wired." Assuming a learning process opens a host of questions, e.g., when, how, and under what conditions are they learned? Assuming they are "hard-wired" brings us back to the probability that the process of determining relative value goes on below conscious awareness.

The process model shown in Figure 7-1 offers a more parsimonious scheme for preference construction and choice among alternatives differing in terms of benefits and costs as defined in relative value theory. Here, the research emphasis shifts from the traditional question of how context factors determine decision strategy. Instead, the constant and stable process assumption suggests questions about the interrelationship of context factors and the evaluative framework that determine the relevancy, prominence, and valence of decision element. It is easy to show that

manipulation of these three decision attribute factors and a constant process can produce the same panoply of choices as if the decision-makers had used specific compensatory or noncompensatory combination heuristics. The results of Hollman and Lynch's (1997) experiments and meta-analyses of binary and trinary choice presented in Chapter 3 offer strong support in this regard. For example, these authors were able to explicate various context effects in forced-choice using the proportional rate of exchange hypothesis even though other theorists (e.g., Wernerfelt, 1995) had concluded that separate models would be required for their explication.

The research presented in Chapters 5 and 6 were designed to test directly the mediating effects of the decision goal and of perceived decision urgency as shown in Figure 7-1. The buying-selling context was chosen for two reasons. One reason it was chosen was the importance the buying-selling context has to the field of marketing. Another reason was that it provided an excellent way to precisely control the decision elements for the two groups while allowing the opposite decision goals of the buyers and sellers dictate the assignation of benefits and costs. It was expected that the resultant inverse PRE-structures would have predictable and differential effects across buyers and sellers because their preference construction process would be the same.

<u>Effect of decision goal and perceived decision urgency on choice</u>

Figure 7-4 presents a summary of supply and demand levels observed for the four computer options depicted in Figure 5-1 from both the sellers' and buyers' views. These results had been reported in disaggregate form in Chapters 4, 5, or 6. The *y-axis* shows the proportion of the available target brand that was "supplied" ("sold") or "demanded" ("bought") for each set type/target brand/competition condition. For example, at the extreme left-hand side of the graph we see that A$low was the target brand with no competitor in a free-choice set, i.e., {defer,A$low}. The PRE-structure was diagnostic indicating that preference should be given to flexible-asset ownership. PRE(Buyer) states PRE<1, specifying that buyers should be reluctant to buy the target brand and conserve owned flexible-assets. PRE(Seller) states PRE>1, indicating that sellers should be desirous to sell the target brand to acquire new flexible-assets. Results shown in the graph

confirm these expectations. The proportion of buyers demanding (choosing) A$low in this condition was only .12 (open circle). Thus, the majority of buyers preferred to conserve their flexible-assets. The proportion of owners supplying (selling) A$low in this condition was .91 (filled triangle). Thus, the majority of owners preferred to acquire new flexible assets. Across all four target-brands, the mean proportion selling was .92 while the mean proportion buying was .16.

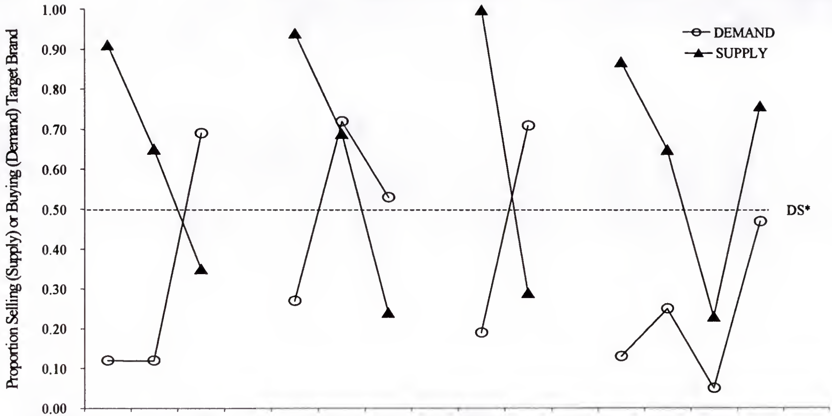
For the other conditions, PRE(Buyer) or PRE(Seller) refers to the proportional rate of exchange relationship between the target and the competitor. Let us take as example free-choice set S{defer,Alow,Clow}. When A$low is designated as the target and C$low is the competitor, PRE(Buyer) is $PRE^{-1} <1$, specifying that the target brand's relative value to a buyer is lower than the competitor's relative value. When C$low is designated as the target, PRE(Buyer) indicates PRE > 1, specifying that the target's relative value to the buyer is higher than that of the competitor A$low. The implication is that buyers should prefer to buy C$low to buying A$low. Note that these two conditions are not complements because respondents were free to choose neither A$low nor C$low. This same set has the inverse PRE-structure when seen from a seller's viewpoint. For example, PRE(Seller) when A$low is the target brand is $PRE^{-1} >1$—the target brand's relative value to an owner is lower than the competitor's relative value, indicating A$low should be sold while C$low should be kept.

The proportion demanded or supplied reflects changes in the evaluation sets' PRE-structures. For example, note that a dramatic change in the level of A$low demanded or supplied does not take effect until A$low's evaluation set's PRE-structure shows that A$low is relatively superior to its competitor C$hi (also refer to Table 5-4 in Chapter 5). Specifically, introduction of competitor C$low highlights the facts that A$low is the relative worst of the three decision options available to buyers but that it is the relative best decision option available to sellers. Consequently, owners (.65) sell A$low although they forego additional revenue to conserve fixed-assets by keeping C$low. Buyers of A$low remain few (.12). The majority of buyers obtain (.71) C$low, preferring to acquire the maximum available level of new fixed-benefits over the conservation of owned flexible-assets.

The reversal in PRE-structure due to the introduction of competitor C$hi causes a reversal in the behavior of buyers and sellers. Buyers (.94) still give preference to the acquisition of fixed-assets. However, a majority (.69) now compromise by acquiring a lower level of new fixed-assets, A$low, and spending a lower level of flexible-assets. In contrast, no owner defers to sell one of the computers. However, now a minority (.35) of owners desires to sell A$low while the majority (.65) prefers to maximize the acquisition of available flexible-assets by selling C$hi.

The supply and demand levels for target brand A$hi clearly show the effect of perceived decision urgency on choice. When the PRE-structure was fully diagnostic in the No-Known-Competitor condition (left-most condition for A$hi in Figure 7-4), A$hi was perceived equally as "overpriced" by buyers and owners, enducing buyers to defer and owners to sell. Introduction of C$hi as A$hi's competitor changed the PRE-structure to one in which both target and competitor are balanced in terms of PRE-units, i.e., PRE(A\$hiC\$hi) = PRE(A\$hiC\$hi)$^{-1}$ = 1. Because both options are equally "overpriced" and respondents feel an intermediate level of decision urgency (free-choice condition), they opt for taking the lesser of two evils. As a result, a majority of buyers (.72) desire A$hi and a relative conservation of owned flexible-assets; a majority of owners (.69) prefer to sell A$hi, foregoing the additional revenue realizable by selling C$hi for a relative conservation of owned fixed-assets. Owners' and buyers' behaviors reverse when the perceived decision urgency increases due to the change in set type to forced: owners must sell one of the computers; buyers must buy one of the computers. Forcing the decision-makers to make a proactive choice highlights the product-options equivalency in PRE-units (PRE=1) from either the buyers' or sellers' perspectives. Hence, relative to the defer condition, significantly greater proportions of buyers maximize the acquisition of new fixed-assets by choosing C$hi and of sellers maximize the acquisition of new flexible-assets by selling C$hi.

The preference changes due to changes in the competitive environment show in Figure 7-4 are due to the effect of learning (e.g., Wernerfelt, 1995). Encountering brands offering similar value rates fosters the assumption such rates are the norm in a product class and induces the choice of the option offering the best relative value from those available to the decision-maker.



Set Type:	Free	Free	Free	Free	Free	Forced	Free	Free	Free	Free	Free	Forced
Target:	A$low	A$low	A$low	A$hi	A$hi	A$hi	C$low	C$low	C$hi	C$hi	C$hi	C$hi
Competitor:	None	C$low	C$hi	None	C$hi	C$hi	None	A$low	None	A$low	A$hi	A$hi
PRE(Buyer):	PRE<1	$PRE^{-1}<1$	$PRE^{-1}>1$	PRE<1	$PRE^{-1}=1$	$PRE^{-1}=1$	PRE<1	PRE>1	PRE<1	PRE<1	PRE=1	PRE=1
PRE(Seller):	PRE>1	$PRE^{-1}>1$	$PRE^{-1}<1$	PRE>1	$PRE^{-1}=1$	$PRE^{-1}=1$	PRE>1	PRE<1	PRE>1	PRE>1	PRE=1	PRE=1
Highest Benefit:	Target	Competitor	Competitor	Target	Competitor	Competitor	Target	Target	Target	Target	Target	Target

Figure 7-4. Magnitude of Demand and Supply curves across experimental conditions. According to relative value theory, the preference construction process is the same for buyers and sellers but their benefits and costs are inverses resulting in inverse PRE-Structures across buying and selling conditions. As predicted, the level of supply and demand for a target brand depended on the PRE-structure, on the transaction goal (buy vs. sell) and on the perceived decision urgency (free-choice vs. forced-choice). See text for a detailed discussion.

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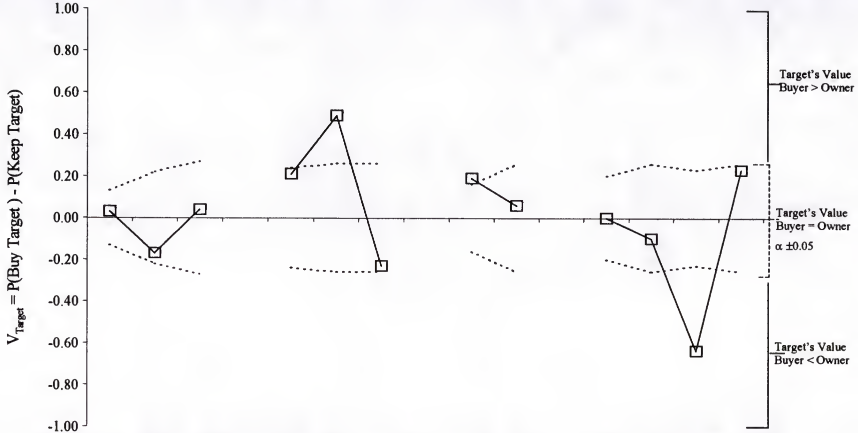
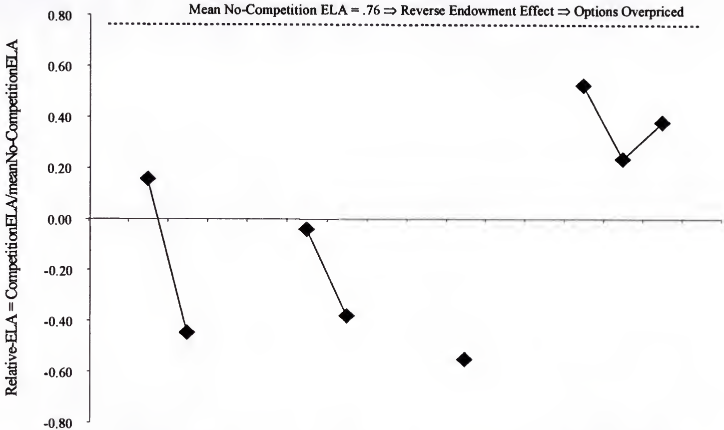


Set Type:	Free	Free	Free	Free	Free	Forced	Free	Free	Free	Free	Free	Forced
Target:	A$low	A$low	A$low	A$hi	A$hi	A$hi	C$low	C$low	C$hi	C$hi	C$hi	C$hi
Competitor:	None	C$low	C$hi	None	C$hi	C$hi	None	A$low	None	A$low	A$hi	A$hi
PRE(Buyer):	PRE<1	$PRE^{-1}<1$	$PRE^{-1}>1$	PRE<1	$PRE^{-1}=1$	$PRE^{-1}=1$	PRE<1	PRE>1	PRE<1	PRE<1	PRE=1	PRE=1
PRE(Seller):	PRE>1	$PRE^{-1}>1$	$PRE^{-1}<1$	PRE>1	$PRE^{-1}=1$	$PRE^{-1}=1$	PRE>1	PRE<1	PRE>1	PRE>1	PRE=1	PRE=1
Highest Benefit:	Target	Competitor	Competitor	Target	Competitor	Competitor	Target	Target	Target	Target	Target	Target

Figure 7-5. Degree of agreement between buyers and owners as to the value of the target brand (V_{target}) across experimental conditions. According to the Coase Theorem, buyers and owners should coincide in their valuation of the target brand resulting in similar proportions of buyers and owners preferring ownership of the target brand. Therefore the expectation was $V_{target} \approx 0$. This prediction was correct in nine of the twelve



Set Type:	Free	Free	Free	Forced	Free	Free	Free	Forced
Target:	A$low	A$low	A$hi	A$hi	C$low	C$hi	C$hi	A$hi
Competitor:	C$low	C$hi	C$hi	C$hi	A$low	A$low	A$hi	C$hi
PRE(Buyer):	$PRE^{-1}<1$	$PRE^{-1}>1$	$PRE^{-1}=1$	$PRE^{-1}=1$	PRE>1	PRE<1	PRE=1	PRE=1
PRE(Seller):	$PRE^{-1}>1$	$PRE^{-1}<1$	$PRE^{-1}=1$	$PRE^{-1}=1$	PRE<1	PRE>1	PRE=1	PRE=1
Highest Benefit:	Competitor	Competitor	Competitor	Competitor	Target	Target	Target	Target

Figure 7-6. Magnitude of Relative-ELA for target brands across competitive contexts. An asymmetric loss aversion interpretation of the endowment effect predictions for lower-tier brands'(A$low or A$hi) and competitor higher-tier brands' (C$low or C$hi) Relative-ELA is 0 < Relative-ELA_{HT} < Relative-ELA_{LT} ≤ 1. The predicted pattern was not obtained.

Comparison of Theoretical Expectations Derived from Relative Value Theory, Loss Aversion and the Coase Theorem

All else equal, standard economic theory implies buyers' willingness-to-pay is similar to sellers' willingness-to-accept while the Coase theorem states allocation of resources is independent of the assignment of property rights. These two premises suggest there should not be an effect of transaction perspective because the valuation process is the same across buyers and sellers. According to Kahneman et al. (1990), all else equal, loss aversion induces asymmetric valuation processes across buyers and owners: owners overvalue owned fixed-benefits, buyers undervalue new fixed-benefits. This implies buyers' willingness-to-pay should not coincide with sellers' willingness-to-accept, implying . In contrast, all else equal, relative value theory asserts that because the valuation process is the same across buyers and sellers, buyers' willingness-to-buy will not be similar to sellers' willingness-to-sell except when the proportional rate of exchange between two options is equal from either transaction perspective (PRE=1). Therefore, with the noted exception, there should be an effect of transaction perspective.

A comparison of Figures 7-5 and 7-4 illustrates why a constant valuation process does not negate the effect of transaction perspective. In Figure 7-5, the *y-axis* shows the magnitude of V_{target}—the degree to which buyers and owners coincided in desiring to own a target brand (see Equation 5.1 in Chapter 5). When $V_{target} = 0$, equal proportions of buyers and owners agree in preferring to own the target brand over ownership of the flexible-assets represented by the target brand's price. When $V_{target} < 0$, a greater proportion of owners than of buyers prefer owning the target brand to the flexible-assets; the reverse holds true for $V_{target} > 0$. The dotted line above or below $V_{target} = 0$ demarcate a zone of V_{target} values that would not be significantly different from $V_{target} = 0$ set at $\alpha = \pm .05$.

There were eight target conditions where the PRE-structure was diagnostic, i.e., PRE $\neq$ 1. In all but one of these cases, the magnitude of V_{target} was about 0. This result appears to lend support to the expectation derived under standard economic theory and the Coase theorem since it

supports their assumption of a constant valuation process. However, seeing the same data displayed in terms of demand and supply shows such a conclusion to be incorrect. The fact that both buyers' and sellers' valuation processes were the same led them to decide on opposite courses of action that were, nonetheless, in accord with their opposite transaction goals. The ensuing strong transaction perspective effect is diametrically opposed to the expectations derived under standard economic theory and the Coase theorem.

Using the evaluation set's PRE-structure, the decision-makers determined whether brands were relatively overpriced or underpriced. When the target brand was relatively overpriced (PRE(Buyer)<1;PRE(Seller)>1), the majority of owners sold that brand while the majority of buyers deferred buying it. Thus, in all cases there was a substantial net oversupply of relatively overpriced target brands. When the target brand was relatively underpriced (PRE(Buyer)>1;PRE(Seller)<1), the majority of owners deferred selling that brand while the majority of buyers decided to acquire it. Thus, in all cases there was a substantial net undersupply of relatively underpriced target brands. This argument is made all the more compelling by one important fact—the perception of whether a particular target brand was either relatively under-priced or relatively over-priced depended on the its buying- or selling-evaluation set's PRE-structure.

On the other hand, V_{Target} may differ significantly from 0 even though buyers and sellers are using the same valuation process. This occurred when choice options offered equivalent relative value (PRE=1) and decision-makers did no perceive the decision urgency to be high. Buyers and sellers opted to minimize the relative expenditures of their opposite types of owned-assets: the owners' fixed-assets and the buyers' flexible assets. As a result, buyers (.72) chose the lower priced brand (A$hi) to the same extent that owners wanted to sell it (.69). Concurrently, few buyers (.05) wanted the higher price brand (C$hi) while most owners (.77) opted to keep it. Thus, for this condition, there were coincident high levels of supply and demand for the low-price brand and coincident low levels of supply and demand for the high-price brand.

The net undersupply of A$low when its competitor is C$hi and of C$low when its competitor is A$low, as shown in Figure 7-4, are typical examples of empirical demonstrations labeled by Thaler (1980) the "endowment effect" because owners appeared reluctant to part with their fixed-assets. Conversely, the equivalent net oversupply of Alow, Ahi, C$low, and C$hi in the absence of a known competitor could be labeled a "reverse endowment effect" because owners appear to be reluctant to part with their flexible-assets. In isolation, either endowment type could be explained in terms of loss aversion. The loss aversion explanation becomes weaker when the entire choice patterns for buyers and sellers is taken into consideration.

Label the observed volume of trade ELA (for the loss-aversion expected endowment effect). ELA for the target brand in a no-competition (NC) context such as {defer,A} is calculated as:

(7.1) NC-ELA = P(sell A:acquire $\$x_A$|defer:keep A) – P(buy A:acquire Benefit(A)|defer:keep $\$x_A$).

Thus, NC-ELA provides a measure of the absolute level of endowment effect present for a target brand. The general expectation under loss aversion would be for NC-ELA to be non-positive (NC-ELA < 0) since owners are expected to overvalue their owned fixed-assets (Kahneman et al., 1990).

Table 7-1 shows that this expectation is not realized for any of the four target brands. Nevertheless, as discussed in Chapter 2, this result does not by itself invalidate a loss aversion explanation. If an option is sufficiently overpriced, it is conceivable that even loss-averse sellers will be willing to sell while even neutral buyers will defer to buy. However, if the asymmetric buyer-seller behavior is driven by asymmetric loss aversion for owned-assets (seller > buyer), the value of a higher-tier brand should be relatively higher for sellers than for buyers.

Kahneman et al. (1990) proposed that the ratio of observed calculated volume of trade (ELA) to the expected volume of trade (ELA*) provided a unit-free measure of trade due to the effect of transaction perspective on option valuation. We can use their suggestion to develop a measure of relative loss aversion (Relative-ELA) in a competitive context (e.g.

{defer,Alow,Clow}). Given the buyers' and sellers' consistent choices across all four target brands (refer Figure 7-4), we can develop a measure of ELA* by using the mean ELA in the absence of competition, i.e., mean NC-ELA = .76. The ratio of a brand's Competition-ELA to mean NC-ELA gives us a measure of relative loss aversion:

(7.2) Relative-ELA = C-ELA/mean NC-ELA.

Table 7-1. Absolute (NC) and competition (C) ELA for target brands across competitive conditions *.

Set Type: Free-Choice				
Target Brand:	**A$low**	**A$hi**	**C$low**	**C$hi**
Tier:	Lower	Lower	Higher	Higher
Competitor:	None	None	None	None
NC-ELA	.79	.67	.81	.74
Mean NC-ELA	.76			
Competitor:	C$hi	C$hi	A$low	A$low
C-ELA	-.34	-.03	-.42	.40
Competitor	C$low			A$hi
C-ELA	.12			.18
Set Type: Forced-Choice				
Target Brand:		**A$hi**		**C$hi**
Tier:		Lower		Higher
Competitor:		C$hi		A$hi
C-ELA		-.29		.29

Note: NC-ELA = P(sell A:acquire $\$x_A$|defer:keep A) – P(buy A:acquire Benefit(A)|defer:keep $\$x_A$).
C-ELA = P(sell A|defer selling,sell C) – P(buy A|defer buying,buyC).

If asymmetric loss aversion is driving the positive mean NC-ELA (indicating brands were overpriced), then higher (HT) or lower (LT) tier brand's ELA should also be positive in a competitive (C) context. However, a higher-tier target brand's C-ELA should be less than a lower-tier brand's C-ELA because sellers should experience a greater loss aversion to disposing of the higher-tier brand while buyers should not be affected by the competitive context. However, by the similarity effect, neither should be greater than mean NC-ELA. Thus, given that mean NC-ELA is positive, the loss aversion prediction for higher-tier (HT) brands and lower-tier (LT) brands is:

(7.3) $0 < \text{Relative-ELA}_{HT} < \text{Relative-ELA}_{LT} \leq 1$.

Each target brand's calculated Relative-ELA is shown in Figure 7-6. Only in four conditions was Relative-ELA positive while only in one condition was the lower-tier (A$low) brand's Relative-ELA both positive and higher than its competitor's (C$low) Relative-ELA. Nonetheless, against expectations, C$low's Relative-ELA is strongly negative. Overall, asymmetric loss aversion provides a poor explanation of the variable magnitudes of Relative-ELA across competitive context conditions. Thus, interpreting the often reported empirical observations of significantly higher selling than buying prices as a manifestation of "loss aversion," as has been done by several researchers (e.g., Kahneman et al., 1990) appears to be misguided.

Summary

Central themes of this dissertation have been that the decision-making process is consistent across decision events and that product-choice stems from the product's evaluation set's relative value structure and not from the product's intrinsic attractiveness. That is, product-choice is a manifestation of a stable relation-based decision process and, therefore, it is not reflective of a stable product-preference rank-order.

Results reported here strongly suggest that even though product-choice may be inconsistent, preferences for specific relative value relations are consistent. What may change from one choice occasion to the next are the decision process' inputs or the decision goal itself. The

decision goal is the milieu within which the decision process is used. Because it defines the domain of the choice task, the decision goal provides an interpretive filter that determines the relevancy, the prominence, and the valence of the decision elements.

As a result, it is not enough to know the identity of products' attributes. Decision researchers need to understand how those attributes are interpreted. Specifically, attributes that are conducive to task goal attainment or increase reserves are perceived as attractive (benefits) while those that are detrimental to task goal achievement or decrease reserves are perceived as aversive (costs). Thus, attributes' valences are defined by decision-makers' interpretation of the decision goal, irrespective of the attributes' intrinsic nature. Moreover, it is well accepted that decision-makers perform benefit-cost tradeoffs to assess value and that diminishing marginal sensitivity pervades discriminal processes. These three basic concepts along with the principle of parsimony constitute the core of relative value theory.

Diminishing marginal sensitivity is well modeled as the ratio of the change in a stimulus to the original stimulus level. Thus, diminishing marginal sensitivity implies people perceive changes in the level of a stimulus in terms of a proportional rate of change. Value is a benefit to cost ratio. Hence, value implies people evaluate the "goodness" of an alternative as a rate of substitution of new benefits (system inflows or "benefit-revenue") to be acquired in exchange for owned benefits (system outflows or "cost-expense"). By the principle of parsimony, for decision options having common benefits and costs that differ in terms of their magnitude, people assess their relative "goodness" as a rate of substitution of the proportional rate of change of the benefit dimension to the proportional rate of change of the cost dimension. That is, they assess relative value through a proportional rate of exchange.

The domain or context of the decision event comprises decision-makers' external and internal choice environments. Any accessible data that is deemed to be relevant to the choice task becomes part of the decision context. Hence, such data are used as inputs to the decision process even when they are not part of the feasible choice set. Consequently, changes in the task goal or in the relevancy or accessibility of information have a direct impact on the output of the decision

process: product choice. Nonetheless, due to the constancy of the decision process, product-preference was shown to be amenable to relative value analysis and prediction either prior to, or after, product-choice actually occurs.

The findings reported here offer compelling evidence that product-choice depends on the proportional-rates-of-exchange structural relationships within a constructed evaluation set irrespective of the availability of the items used in the valuation stage. Moreover, it was shown that distinctive set changes corresponded to characteristic choice patterns across two levels of product-decision urgency: high product-decision urgency, as typified by the forced-choice format, and intermediate-decision urgency, as symbolized by free-choice contexts.

Trade in the marketplace depends on the decision-making of parties that heretofore had been conceptualized as having different strategies and valuation processes: buyers and sellers. Relative value theory provides a different way to study the observed behavioral asymmetries of buyers and sellers. Because buyers and sellers are presumed to use the same decision process under relative value theory, both can be conceptualized as "seekers" of transaction benefits, as "cost misers" and as "users" of the decision-context's relative value structure to guide their choices.

This novel way of perceiving buyers and sellers lead to an important insight. Although buyers and sellers have the same overarching goal--the obtaining of the highest relative value per transaction--they view the problem from opposite perspectives: the buyers' benefits are the sellers' costs; the buyers' costs are the sellers' benefits. Seeing the buyers' and sellers' decision spaces as reciprocal suggested a redefinition of the traditional willingness-to-pay and willingness-to-accept concepts. To either buy or to sell, decision-makers must abandon their "steady state" position, represented by their status quo, and actively engage in a market transaction. Thus, the more parallel terms of willingness-to-buy and willingness-to-sell were proposed and successfully tested. These two terms were shown to be equatable and reciprocal when expressed in proportional rates of exchange units. Specifically, all else equal, buying and selling prices were shown to coincide when the evaluation set's proportional-rate-of-exchange structural configuration was diagnostic. They were shown to not coincide when the PRE structural configuration was non-diagnostic. This

result was observed even though, valuation processes for both sellers and buyers were shown to be equal.

Economic theory was developed to understand the aggregate choice of decision-makers engaged in economic transactions at an extreme level of analysis: the entire marketplace. Psychology's domain is the individual. Behavioral researchers, employing psychological principles, have developed theories to explain choices made by a single decision-maker engaged in an economic transaction. Thus, behavioral researchers' level of analysis has been the opposite extreme of economic theory's level of analysis: the individual consumer. In contrast, marketing's interests are in the understanding of interactions within and across sub-markets. These sub-markets are represented by groups of individuals deciding among groups of competing brands. Thus, the need in marketing is for an intermediate level of analysis.

Both economic and behavioral perspectives have provided the marketing scientist with "right" answers given their idiosyncratic extreme levels of analysis. However, we marketing scientists may have been asking the "wrong" questions given our intermediate level of analysis. Thus, market choice behavior has appeared to be non-rule based, i.e., "irrational" or random. This is well illustrated by the aggregate level choice shares of the choice options in each of the studies reported in Chapters 4, 5, and 6. The random-seeming aggregate choice was derived from local choices made within sub-markets having opposite competitive contexts. The choices made within each of these sub-markets were entirely consistent with the choice rules of a relation-based preference model based on relative value theory. Thus, relative value theory provides the necessary framework for the study of competitive interactions in the marketplace. The theory accomplishes this by subsuming basic concepts from both economic and behavioral paradigms and amalgamating them in a comprehensive way.

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BIOGRAPHICAL SKETCH

I came to this country as a Cuban refugee at the age of 12 along with my three brothers. We were eventually reunited with our parents two years later. I was a wife and mother by the age of 17. During the five years prior to the birth of my second child, I worked in the international department of a large metropolitan bank where I rose from "go-fer" to department manager. During my last two years in the banking industry, I started my formal education by attending Miami-Dade Community College as a part-time night student. During this period, I developed research interests that endure to this date: the understanding of human behavior in general, and the interaction of information processing and change in particular. This emphasis has been the unifying force behind what may seem to be a disparate academic background.

I was admitted to the University of Miami as an undergraduate student in 1974. Since then, I have pursued a rigorous program of research through study, observation, and active participation in the business world. While at the University of Miami, I completed undergraduate studies with concentrations in biology and education, graduating Magna Cum Laude, and graduate studies in business management and in the analysis and design of business information systems. Concurrently, I became a business consultant. Spending over ten years devising and implementing changes at the operational and financial levels in companies of varied industries allowed me to carry direct "tests" of the theory learned in the classroom. I continued the same approach of theory and practice during subsequent psychology and fine art studies pursued at Florida International University and completed with High Honors. Specifically, I concentrated on exploring perceptual processing, affect, arousal, and communication issues through painting and printmaking. After closing my consulting practice, I moved to Gainesville to continue deepening my knowledge of perceptual processing and arousal through graduate studies in neurobehavioral relations and

human brain function for two years at the University of Florida prior to entering the marketing doctoral program in Spring, 1993. My eclectic academic background has allowed me to take an interdisciplinary approach to the study of complex problems in marketing, while the business experience has ensured that the research is driven by the substantive concerns of this field. My current research interests are in decision making, marketing strategy, and negotiations.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Joseph Alba, Chair
Professor of Marketing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Chris A. Janiszewski
Associate Professor of Marketing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the Department of Marketing in the College of Business Administration and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December, 1997

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